the OIL AND GAS JOURNAL

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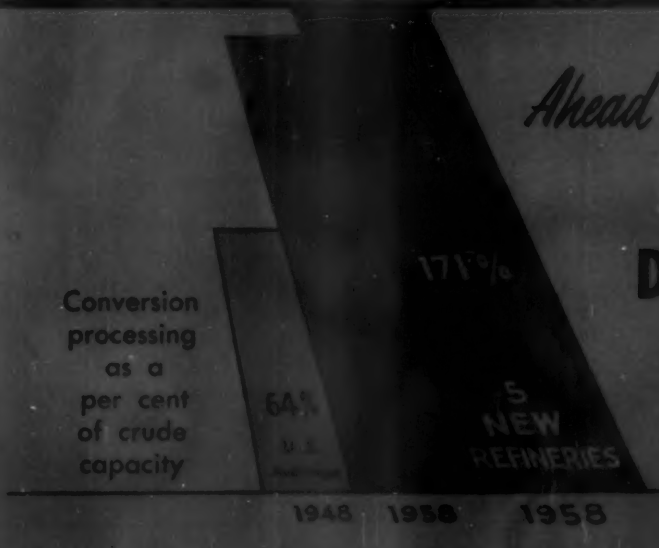

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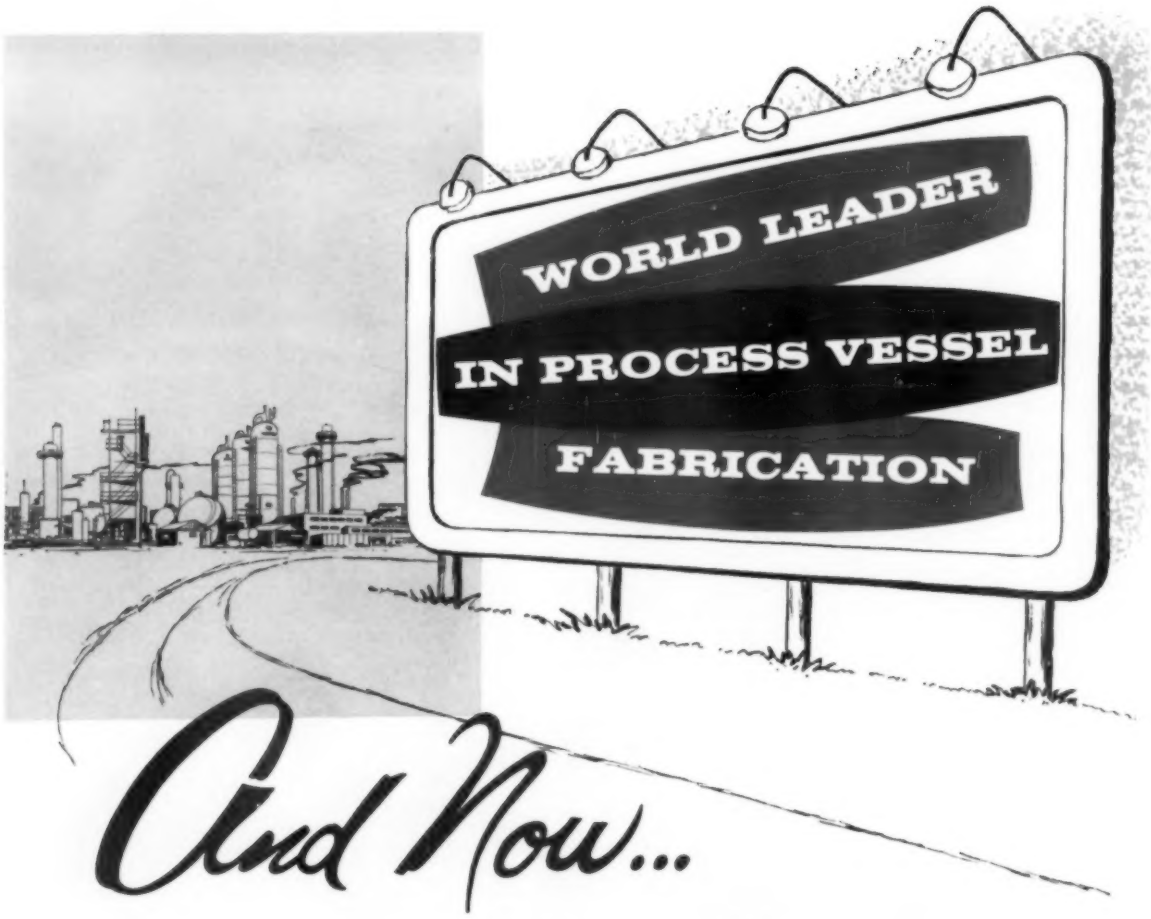

And Now...

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1913 Incorporated in Dallas as Wyatt Metal Works

1917 Merger with Dallas Boiler Works; name changed to Wyatt Metal & Boiler Works

1929 Houston plant, now Wyatt's largest, put in operation

1955 Wyatt's Plastics, Inc. Plants in Houston and Wallis (Wholly owned subsidiary)

1957 Wyatt de Mexico S.A. C.V. became an affiliate

1958 Existing facilities bought in Corpus Christi

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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
August 11, 1958

Midyear financial statements make one fact clear:

Product prices and marketing activity are vital to the healthy financial position of the oil industry.

Sinclair is an excellent example of what's happening.

Sinclair's volume of business has been satisfactory this year. Net crude production is up. Domestic sales volume is up, although total sales volume is off 1.8%. But lower price realizations plus increased wage and other costs have resulted in a lower net income for first half.

Jersey Standard, biggest oil company of all, reports the same story which could be repeated for others: Product sales volumes for first 6 months up but revenues down because of lower average product prices.

Economists think the downward trend reflected in the midyear reports has now changed and the last half will look better. But the reports explain why the industry is striving so hard now to avoid sloppy product markets.

Severe production cutbacks this year also are playing hob with the economics of oil-well payouts.

Some big deals made in past 2 years based on production payments now don't look so good. The production cutbacks have extended the payout time. When an interest factor is applied to this extended payout period, it cuts the anticipated profits.

The oil industry will start feeling the impact of steel-price hikes more toward the end of the year.

That's when present inventories will be down enough to force companies back into the market for quantity buying. Right now, stocks still are high enough to permit oil operators to coast along, buying only for current needs.

Higher prices will add about $48 million to industry's steel bill next year. Initial boosts were $10 a ton for drill pipe, $8 for tubing, $7 for seamless casing, $6 for line pipe (p. 65).

Look for increases to spread to other oil country goods—sucker rods, pumps, pumping units, tanks.

Important changes are contained in new field rules now being proposed by Oklahoma Corporation Commission.

When hearings start this fall on the rules, expect the controversy to center around two areas:

...Allowables. The minimum per well allowable is being dropped. Instead, depth of well and lifting-cost factors are used in a new chart to determine allowables for wells in allocated pools. Maximum allowables for unallocated pools in practice probably will equal the minimum allocated allowable. Rules on water floods are stricter and their allowables are figured each 6 months.

...Purchasing. Common purchaser is required to take the legal allowable from his connections. Commission also is given authority to force a purchaser or carrier to extend his line or expand services. Common purchaser or carrier is not permitted to abandon service without permit.

Other rules pertaining to drilling and exploration also are being tightened up. Operator is made responsible to see that rules are followed. The penalty: A contempt citation or loss of allowables (p. 70).

New 1959 model cars will soon make their bow. Here's what to expect:

...Slightly higher compression ratios.

...A little more horsepower.

...More complex carburetion.

...Increased gadgetry.

That means new models will need a little more gasoline, and a little better quality. Compression ratios are expected to go up .15 to .25 units. If so, an additional half octane, Research, would do the trick (p. 76).

Proof that rockhounds have what it takes to work up the promotion ladder:

Four out of five major oil companies have at least one geologist holding down an executive position.

That's shown in a Journal survey of 50 major oil firms. Forty-one of the companies have executives who are members of the AAPG or the SEG.

Here's a rundown on the number of geologist-executives in the companies surveyed: 82% have at least one; 24% have two; 12% have three. One firm has four former rockhounds helping run the business.

Illinois has its best strike of the year.

Reeter & Hirstein 2 Levi Montgomery flowed 2,000 bbl. of oil per day, natural, from Silurian rocks at 1,890-1,901 ft. It's located 2 miles south of Mount Auburn in Christian County.

Scene of prolific new play is South-Central Oklahoma's Washington area.

Kirby Petroleum found 300 ft. of pay in first Bromide

and Oil Creek sands of Ordovician age at its 1 Weeden in McClain County.

Drill-stem tests from 9,177 to 10,025 ft. got recoveries of 1,000 ft. of clean oil. Oil flow was more than 50 bbl. per hour. New play is in area of considerable faulting about 12 miles long and 1 mile wide, northeast-southwest.

Utah's only Mississippian producing area, Big Flat, has an apparent confirmation discovery.

Pure Oil's 2 Big Flat Unit got 2,310 ft. of gas-cut oil on drill-stem test at 7,753-7,810 ft. It's located in Grand County at north end of Paradox basin. The discovery well, completed last fall, flowed 319 bbl. of oil per day.

Continental Oil staked a 13,000-ft. Mississippian test east of Big Flat on Colorado side of basin. That adds more fuel to fast-growing search for Mississippian production in northern Paradox.

Rocky Mountain wildcatters may be missing a bet in Montana's Disturbed belt (p. 145).

A chain of rich gas-condensate fields has been found in the Foothills belt of southwestern Alberta. Some wonder why that hasn't stepped up exploration in the Disturbed belt, a southward extension of the same region.

One recent strike in Teton County, Montana, may stimulate more Disturbed belt activity.

Texas' tax on natural-gas production may be levied on full price producers charge at wellhead. That's state attorney general ruling, even though part of price includes "escalator" increases not yet approved by FPC. He says if FPC later rejects increases, the state can apply overpayment against producers' future taxes.

Petroquimica, the Venezuelan government's petrochemical company, will start laying a $20-million natural-gas line soon from Moron to Barquisimeto.

This line will supply government gas to sugar refining centers at Matilde and Turbio, and to the big cement plant of Venezuelan Cement Co. in Barquisimeto.

Tennessee Gas Transmission's investment in Trans-Canada Pipe Lines paid off in more ways than one.

Chief aim: Get the line going to stimulate Canadian development, and to purchase Canadian gas for import into U. S. Midwest. TGT provided capital and know-how to help convert Trans-Canada from "paper project" to operating pipeline.

And, the company reports a net profit of $2,403,664 was realized when its 5.6% common-stock interest was liquidated.

Milestone: Standard of Indiana produced its 60 billionth gallon of gasoline in July. Records date back to September 1890. That's when the company began operating its Whiting, Ind., plant. This plant alone produced more than half the 60-billion total.

Figure does not include production from subsidiary company plants. It includes gasoline manufactured from the company's six refineries: Sugar Creek, Mo.; Wood River, Ill.; Neodesha, Kan.; Casper, Wyo.; Mandan, N. D., Whiting.

Refiners are faced with higher operating costs, more complex processing arrangement.

That's because of continued growth of downstream processing (p. 74).

Look at the trend during last 10 years. Crude capacity once overshadowed downstream processing capacity. That's been almost reversed.

Increasing complexity reflects changing motor-fuel requirements, stiffer competition.

Sign of the times:

American Oil has started offering free ''road maps"" to outer space. An illustrated leaflet entitled "Venture Into Space" is available at Amoco stations. It shows the space man where to expect to find orbiting satellites and various planets.

As yet, no announcement on when the first Amoco space service station opens.

Continental Oil is joining earlier companies in a plan for promotion and recognition of its research scientists. It gives scientists a chance to climb the salary ladder without taking on administrative or supervisory responsibilities.

Interesting government study of technical manpower in U. S. and Russia which has received little publicity points to these trends:

...Crucial problem in U. S. over next 10 years will be limited growth in number of men aged 25 to 44 even though total labor force will grow. Russian labor force will keep steady but the 25-44 bracket will expand fast. This means U. S. will be short in group which supplies leaders for technological and economic growth.

...Total scientists and engineers employed in Russia is about same as in the U. S. But current flow of new science and engineering graduates is significantly higher in Russia.

...But U. S. is educating at the college level a far greater total number and greater proportion of its population.

This underscores two points: Different manpower aims of the two countries. Greater availability of other types of brainpower to the U. S.

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Good Wells Make Good News

A Special Report on Successful Cementing Jobs

August 11, 1958

CEALMENT* is a Dowell-developed cementing service that uses special latex-cement. This latex-cement has low fluid loss and good sealing characteristics. When set, it has demonstrated excellent resistance to shattering. These properties make possible results like those reported here.

- **Southern Saskatchewan, Canada.** A well in the South Alida Beds pool of the Nottingham field was making only 50 bopd and 50 bwpd. The formation—of the Mission Canyon series—was squeezed with 400 gallons of Dowell latex-cement. Final squeeze pressure was 2000 psi. *After re-perforating, well tested at a capacity rate of 300 bopd with negligible water. Six months later, capacity of well was unchanged; water production was negligible. Potential still exceeded production.*

- **Midland County, West Texas.** This well was to be completed with pay zones in Devonian and the Strawn. Since both zones might need stimulation, separation was necessary. A 5½-inch liner was set from 9963 to 11,545 feet using 2000 gallons Dowell latex-cement. *As a result, communication between zones was prevented.*

- **Baton Rouge Parish, Louisiana.** This well had a hole in the casing at 6940 feet, which was above the primary cement job. Cealment was selected to repair the hole. 800 gallons of latex-cement was squeezed using a pressure of only 100 psi. *After the remaining latex-cement was drilled out, casing held 1500 psi test pressure.*

- **Marion County, East Texas.** A well was completed through perforations into the Henderson sandstone from 6039 to 6044 feet. It was acidized but channelled to water. To repair the channel, Dowell used Cealment with 500 gallons of latex-cement. After squeezing, drilling out and re-perforating, well swabbed 36 bopd but would not flow. Dowell cleaned the formation with 500 gallons of lease oil containing two per cent Mudlax.* *After treatment, well flowed 72 bopd by heads, with no water. All three treatments paid out in less than 10 days of producing time.*

For detailed information on Cealment, or prompt service, call any of the 165 Dowell service points. In Canada, call Dowell of Canada, Ltd.; in Venezuela, contact United Oilwell Service. Or write Dowell, Tulsa 1, Oklahoma.

*Dowell Trademark

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TECHNOLOGY—OPERATION

Drilling-Production

Gulf Puts System Into Blowout-Preventer Testing 95

By Ed McGhee

Here is a three-color chart which shows a step-by-step procedure for testing blowout-prevention and casing-head equipment. It represents one of the first positive steps anyone has taken to make certain that this vital equipment is tested properly and at the right times.

Engineering Details of the First Four-String Quadruple Completion 98

By W. W. Poimboeuf and Robert Henderson

Four strings of 2⅜-in. extreme line tubing were installed in a CATC well 12 miles off the coast of Louisiana in the Gulf of Mexico. Increased allowable is believed to more than offset the additional cost of the well. This installation proved that detailed preparation should be made before the actual completion work is begun.

World's Longest Casing Strings Set in West Texas 106

By Ed McGhee

Setting 22,919 ft. of pipe in the 1 EE University and 23,000 ft. in the 1A Montgomery in a little more than 1 month, Phillips has set records on top of records. Deep as they are, these are not production strings (yet) as drilling continues in one, and will be resumed in the other. New records will be written every day, as Pecos County, Texas, becomes the world's basement.

On The Job . . . In The Fields: Creek County, Oklahoma, Water Floods 116

By Norman S. Morrisey

The principal water-flood objectives in Creek County are sands in the Pennsylvanian section found at depths ranging from 1,200 ft. to as much as 3,500 ft.

How To Handle Water in Air Drilling 121

New foaming agents convert formational water to a mist. This enables the operator to drill without difficulty. Here is a case history of an operation in the Booneville area of western Arkansas.

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Submarine Trenching Proves Practical for Offshore and Water-Crossing Work 111

By S. V. Collins and Paul Reed

A jetting machine especially designed for working directly on the river bed or ocean bottom for submarine trenching has many advantages over the conventional method applied by operating from barges. The machine can trench at greater depths of water, bury pipe at greater depths, and do a variety of jobs at lower cost.

Refining-Processing

Radioactive Coke-Level Indicators Increase Delayed-Coker Capacity 93

By Paul G. Wright

Using the level indicators it was possible to determine the effect of temperature and steam rate during operation at the coking units of Socony Mobil Oil Co.'s East St. Louis refinery. Increasing both temperature and steam rate reduced foam height and prevented carryover.

Daura, Iraq, Refinery Boasts New Complete Lube Plant 101

By Mohammed Al-Naqib and J. W. Mitchell

This new plant of the Daura refinery near Baghdad uses the most modern processes and equipment to produce up to 455 bbl. per day of all types of lubricating oils from a feed of 2,170 bbl. per day.

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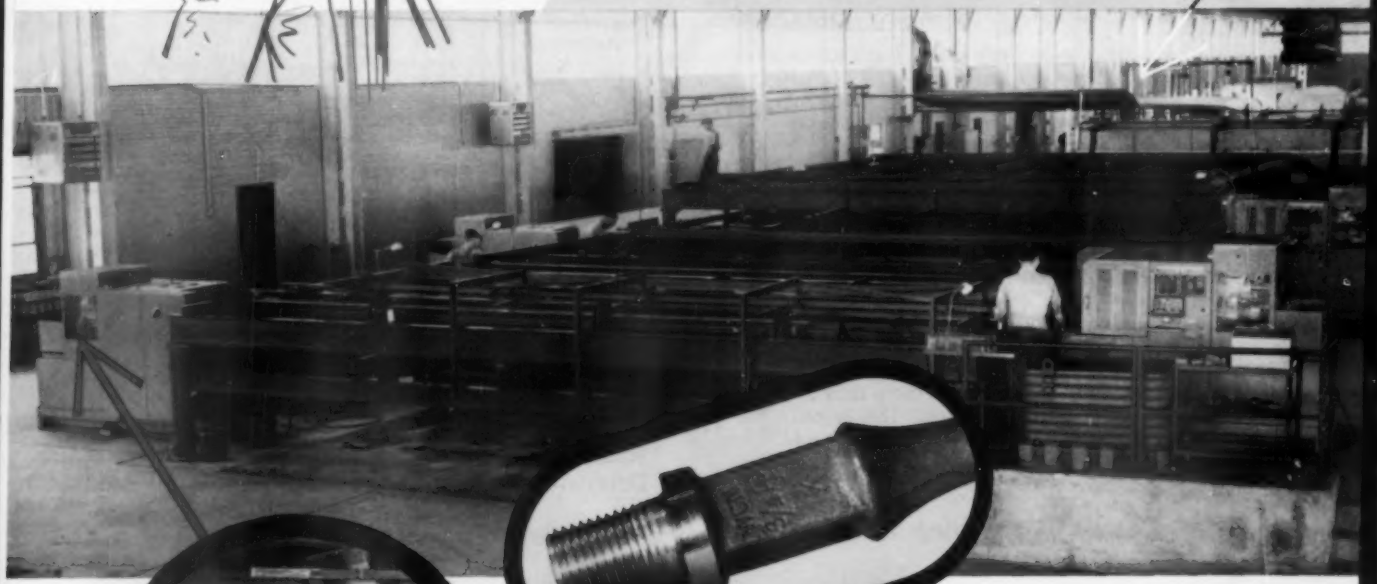

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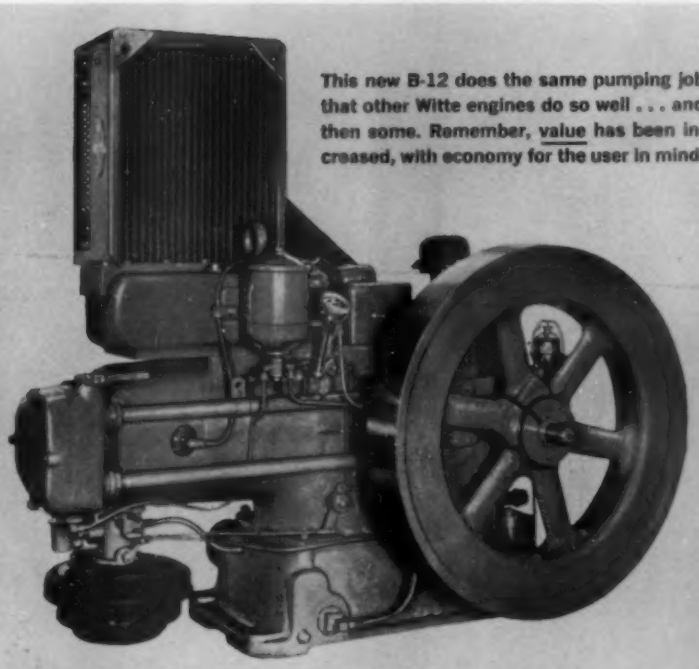

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4. Provides circulation of fluids through end of Shoe until shoe packer rubber is expanded and set.

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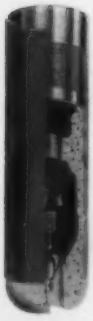
Halliburton's effective Mud Cleanout Agent, the industry's most efficient mud dispersant, helps to clean out mud and soft filter cake in the annular area, reducing the possibility of cement channeling and providing better bonding of the cement to the formation.



AUTOMATIC FILL-UP FLOAT SHOE

AUTOMATIC FILL-UP FLOATING EQUIPMENT:

A unique orifice type attachment "meters" the upward flow of drilling fluid through Float Shoe or Float Collar, thereby allowing casing to be filled automatically while it is being run to bottom . . . helps to reduce damaging pressure surges on the formation . . . easily operated and easily drilled. Automatic casing fill-up may be stopped when desired by tripping the automatic fill-up unit with pump pressure and fluid volume, using conventional rig pump.

TUBING CENTRALIZERS:

Used on tubing strings in deep wells to help protect tubing and collars against wear when the string is frequently pulled and then re-run. In some areas, tubing is used as production string and for water injection wells; gives better centering in the bore hole and allows for better placement of cement around the tubing string. Tubing centralizers are also used on strings for protection of flow valves (gas lift).

TUBING CENTRALIZER

CASING SWIVEL FOR FORMATION PACKER SHOE:

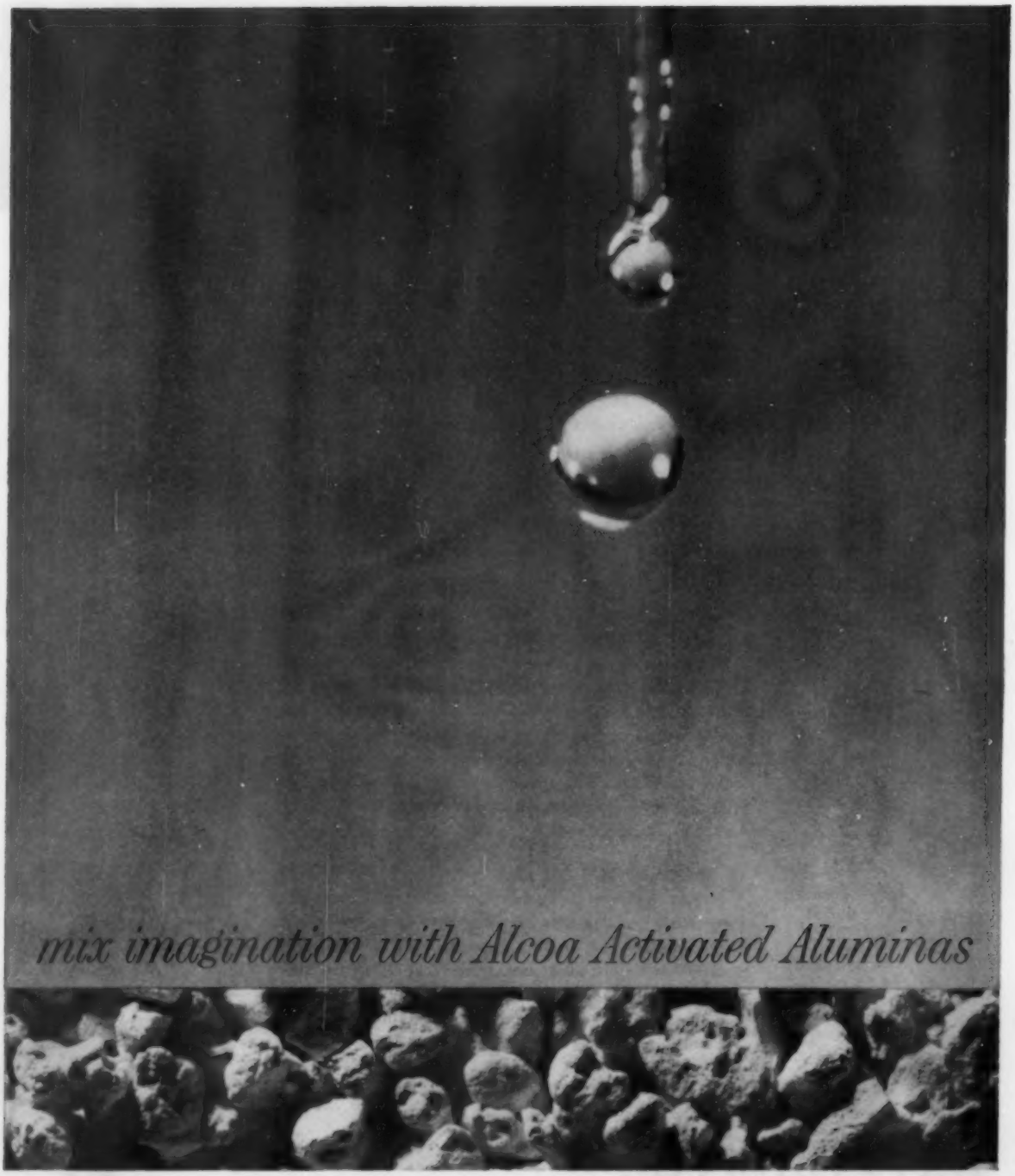
Permits rotation of casing with Roto Wall Cleaners and Casing Centralizers installed after the Formation Packer is fully expanded against wall of open hole. Swivel is installed above Packer Shoe on first joint; wall cleaners and centralizers above swivel. A thrust bearing in upper housing provides swivel action and is tested to exceed normal cementing pump pressures. Swivels are available for casing sizes 4½" through 8⅝".

CASING SWIVEL FOR FORMATION PACKER SHOE

HALLIBURTON CEMENTING SERVICES

HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

"A WELL WORTH CEMENTING IS WORTH CEMENTING WELL"

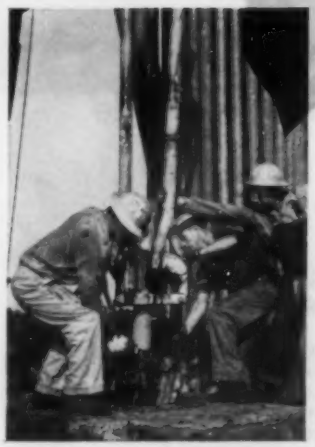


to remove the last drop of unwanted product or process water. Is unwanted water undermining your product quality . . . or ruining the efficiency of your process? If so, try this sure solution to your dehydration problems: mix imagination and engineering with Alcoa® Activated Alumina. You can count on this old reliable among commercial desiccants to achieve the lowest dew points you require. It can never soften, swell or disintegrate. It is nontoxic, noncorrosive and practically iron-free. It can be saturated and reactivated through almost endless cycles—to keep drying costs low. Put the proved effectiveness of Alcoa Activated Alumina to work in solving *your* dehydration problems. Drying machines charged with Alcoa Activated Aluminas are available from a number of manufacturers. For their names, or for product information, contact your local Alcoa sales office. Or write ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 715-H Alcoa Building, Pittsburgh 19, Pa.

ALCOA CHEMICALS

"ALCOA THEATRE"
Exciting Adventure
ALTERNATE MONDAY EVENINGS

For finer products . . . let Alcoa add new dimension to your creative thinking!



MORE WAYS THAN ONE

TO BE AN OIL MAN

Ask the toolpusher what he is, and he says he's an oil man. Ask the mud dealer, the wire line operator, the supplier. Ask the tool rental man, ask the man 'dozing the slush pits, the drilling contractor, the producer. They are all oil men. And the oil industry depends on all of them and many more.

The Oil and Gas Department of The National Bank of Commerce of Houston has helped and is helping all of these oil men. The Commerce can help you because it knows what it's talking about, and, even more important from your point of view, it knows what *you're* talking about. If you are planning to drill, if you are planning to extend needed services, if you are in the oil business, you'll find that The National Bank of Commerce will help you all the way.

E. O. Buck, *senior vice president*
Oil and Gas Department.

THE NATIONAL BANK OF

COMMERCE

OF HOUSTON

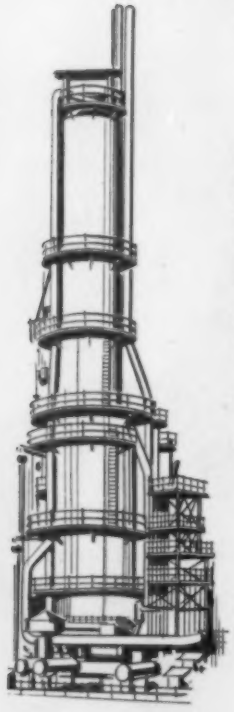
GULF BUILDING MAIN AT RUSK HOUSTON

Facilities of the Oil and Gas Department of The National Bank of Commerce of Houston are available in Wyoming, Nebraska, Colorado, New Mexico, Louisiana, Mississippi, and Texas.

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

CATALYTIC EROSION RUINED THIS STEEL SLIDE VALVE . . .

BUT NOT THE VALVE PROTECTED BY CARBOLOY® CEMENTED CARBIDE



Parts wearproofed with Carboloy cemented carbide withstand erosion, corrosion, and abrasion that rapidly ruin other materials. Here's why:

Carboloy cemented carbide is harder than the hardest steel . . . and practically inert to acids found in oil and gas. Even the powerful catalyst used in fluid cracking units does not erode it.

Here's proof: The slide valves shown above were both subjected to fluid catalyst at The Atlantic Refining Company. The unprotected valve failed, causing a costly emergency shutdown.

The valve lined and faced with Carboloy cemented carbides has been on the job continuously for *over a year* . . . without any wear to the face, and very slight wear to the liner. The price of wearproofing with carbide was about $2000 . . . small, compared to the high cost of an emergency shutdown.

Carboloy cemented carbide's great resistance to erosion, corrosion and abrasion—and its ability to stand great impact—make it an ideal material for the oil and gas industry. It outwears even hardened stainless steel by up to 20 to 1 . . . reduces service costs, helps maintain continuous production.

For more information on Carboloy cemented carbides for wearproofing, or API balls and seats, check your local supplier, or write: *Metallurgical Products Department of General Electric Company, 11181 E. 8 Mile Street, Detroit 32, Michigan.*

CARBOLOY®
CEMENTED CARBIDES

GENERAL ELECTRIC

are used again and again!

The laminated construction of Tube-Tectors® means tighter grip on the drill pipe. It also means more resiliency, more economy in use. Tube-Tectors can be moved from one string of pipe to another with perfect confidence even after three or more moves. But despite the unique design and manufacture features, and the economy of extended re-use, Tube-Tectors cost no more than ordinary protectors. Here's another good way to cut drilling costs—from Tuboscope. Call a Tuboscope engineer now.

The design and laminated construction gives a tighter grip, prevents slippage, reduces ring corrosion.

Tuboscope COMPANY

2919 Holmes Road
HOUSTON, TEXAS

Tuboscope drill pipe-casing protectors and pipe inspection services are available in oil fields throughout the United States and Canada.
For export: write Tuboscope.

A. O. Smith developed the rotary positive displacement metering technique. Years of service for "top drawer" companies have proved its exceptional accuracy.

A. O. Smith meters for bulk plants, pipelines, refineries and industrial service

Perfect Auditors

A. O. Smith meters — which print a permanent, tamperproof record of each transaction — are assuming the role of business machines in custody transfer and similar types of service. Why not contact your representative or write direct and let us tell you how this new development more than pays for itself in terms of conserving manpower . . . eliminating disputes . . . simplifying accounting and bookkeeping.

Illustrated, S-33 Meter, rated capacity is 350 G.P.M., working pressure 150 p.s.i.

Through research . . . a better way

A.O.Smith

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METER, SERVICE STATION PUMP, DIVISIONS

Executive 5715 Smithway St., Los Angeles 22, Calif.; P. O. Box 500, Suggsville, N. J. Offices: Atlanta 5, Ga.; Chicago 3, Ill.; Houston 2, Texas; Los Angeles 22, Calif.; New York 17, N. Y. Canada: Toronto 12, Vancouver 3. A. O. Smith INTERNATIONAL S. A., Milwaukee 1, Wisconsin, U. S. A.

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Mathieson ethanolamines are produced and shipped in accordance with your operating requirements. They are available in tank car,

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ETHANOLAMINES

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Whatever your prime requirement... high quality, ready availability, technical service...for ethanolamines, contact your Olin Mathieson representative. Write today for further information and data sheets.

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Ethylene Dichloride
Surfactants (Poly-Tergents)
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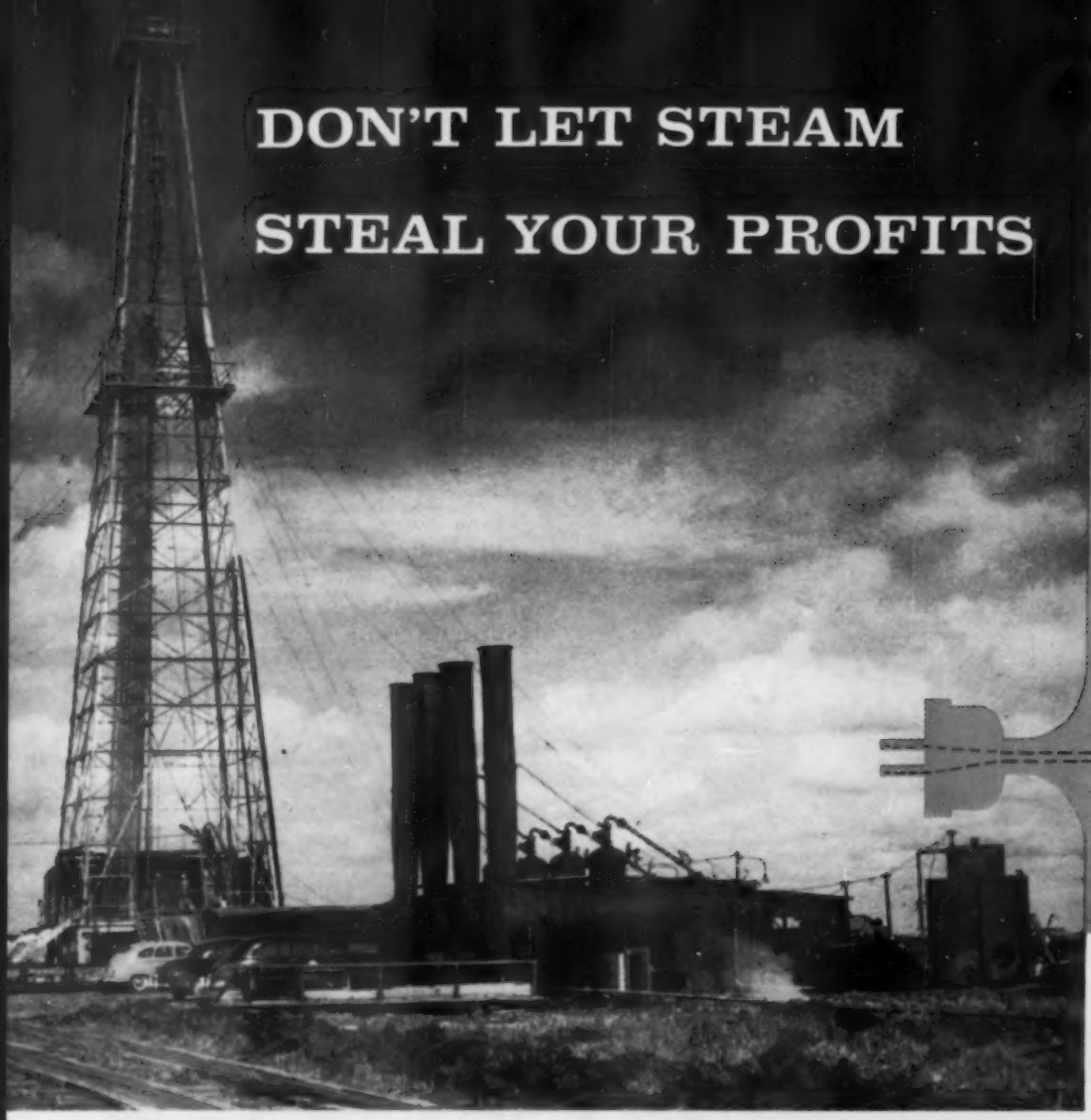
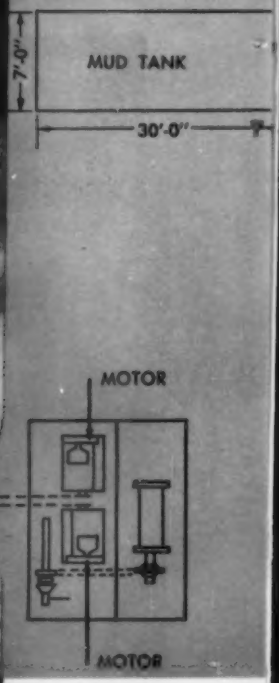
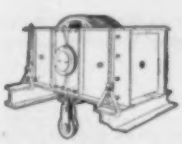
ALCO OIL FIELD EQUIPMENT

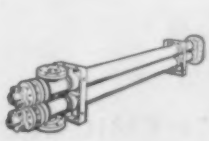
DON'T LET STEAM STEAL YOUR PROFITS



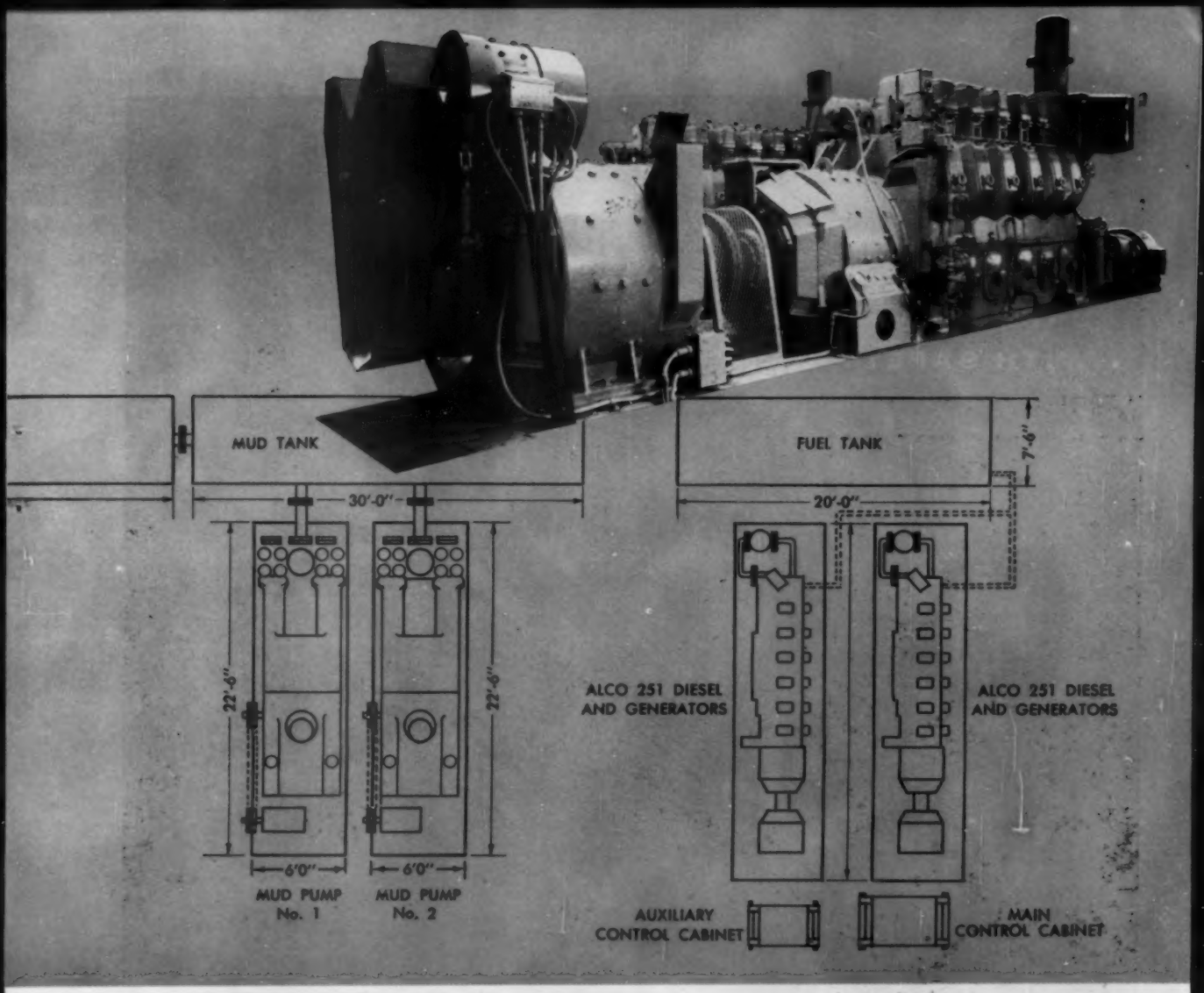


PLUG





Crown and travelling blocks • Wellhead equipment • Finned tube products • Kinney plug injectors • Oil-field valves



IN ALCO DIESEL-ELECTRIC POWER

Put yourself back into competitive bidding—at a better profit—with diesel-electric drilling power by ALCO. Utilizing the famed ALCO 251 diesel, this modern and most economical way to drill will cut your fuel cost, compared to steam power, by as much as 60 per cent. The fuel savings alone in four years can pay for the cost of ALCO power.

You'll save again when moving to new locations, because ALCO power weighs 30 per cent less than steam boilers. You'll realize a further saving through a 10 per cent reduction in rig-up time.

ALCO diesel-electric drilling power is designed, engineered and assembled in Beaumont, Texas, by men who know drilling problems. In three years' field use it has demonstrated its advantages over other comparable diesel power with less fuel consumption, easier maintenance and more efficient electrical operation.

Field engineers trained in the operation and maintenance of ALCO drilling power are located in Houston, Beaumont, New Orleans, and Biloxi. Parts are stocked in Beaumont and Odessa. For complete information on all the savings and advantages of ALCO power, write ALCO Products, Inc., Petroleum Industry Equipment Division, Dept. 187, Bank of the Southwest Building, Houston 2, Texas.

ALCO

ALCO PRODUCTS, INC.
Petroleum Industry Equipment Division
HOUSTON

Ski lift operators stress safety when it comes to buying wire rope. Too many lives are at stake. So they buy . . .

A Safe Lift

Even though you don't operate a ski lift, false economy can be costly in your rope purchases, too. For a rope failure can cause personal injury . . . wreck your equipment . . . throw off your entire work schedule . . . and affect employee morale. Yes, a "bargain" wire rope may save you money, yet cost you your peace of mind. Don't take a chance. Buy a rope that's a quality rope—buy Wickwire Rope.

CF&I

WICKWIRE ROPE
A CF&I PRODUCT

LOOK FOR THE YELLOW TRIANGLE

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

5050

THE COLORADO FUEL AND IRON CORPORATION — Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
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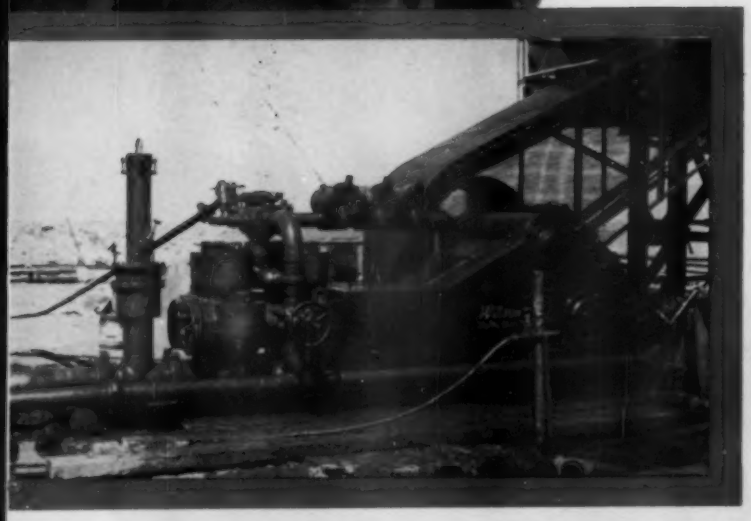
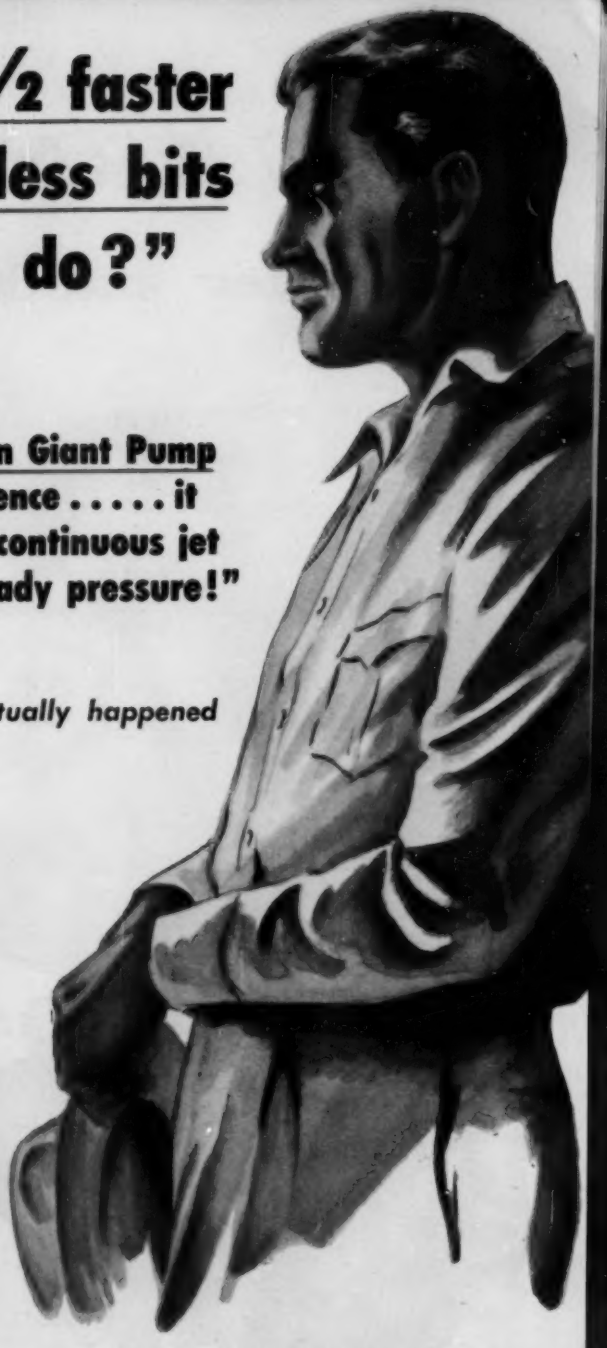
New York • Philadelphia

"How do you drill ½ faster and use ⅓ less bits than we do?"

"My Wilson Giant Pump is the difference . . . . . it provides continuous jet flow for steady pressure!"

This conversation actually happened





Two comparable rigs drilling the same field . . . the same formations and one outdrills the other by 50% and at the same time uses one-third fewer bits! The rig equipped with the WILSON GIANT SLUSH PUMP made possible the faster drilling time. Savings in drilling time and savings on bits used paid for the new Wilson Pump in short order. YOU CANNOT AFFORD TO DRILL WITHOUT A WILSON SLUSH PUMP . . . call or write WILSON TODAY for details.

- **Steady pressure with Suction Flow Equalizer**
- **More compact, lighter weight**
- **Uses revolutionary chain drive**
- **Comparatively trouble-free**
- **High speed, high capacity.**

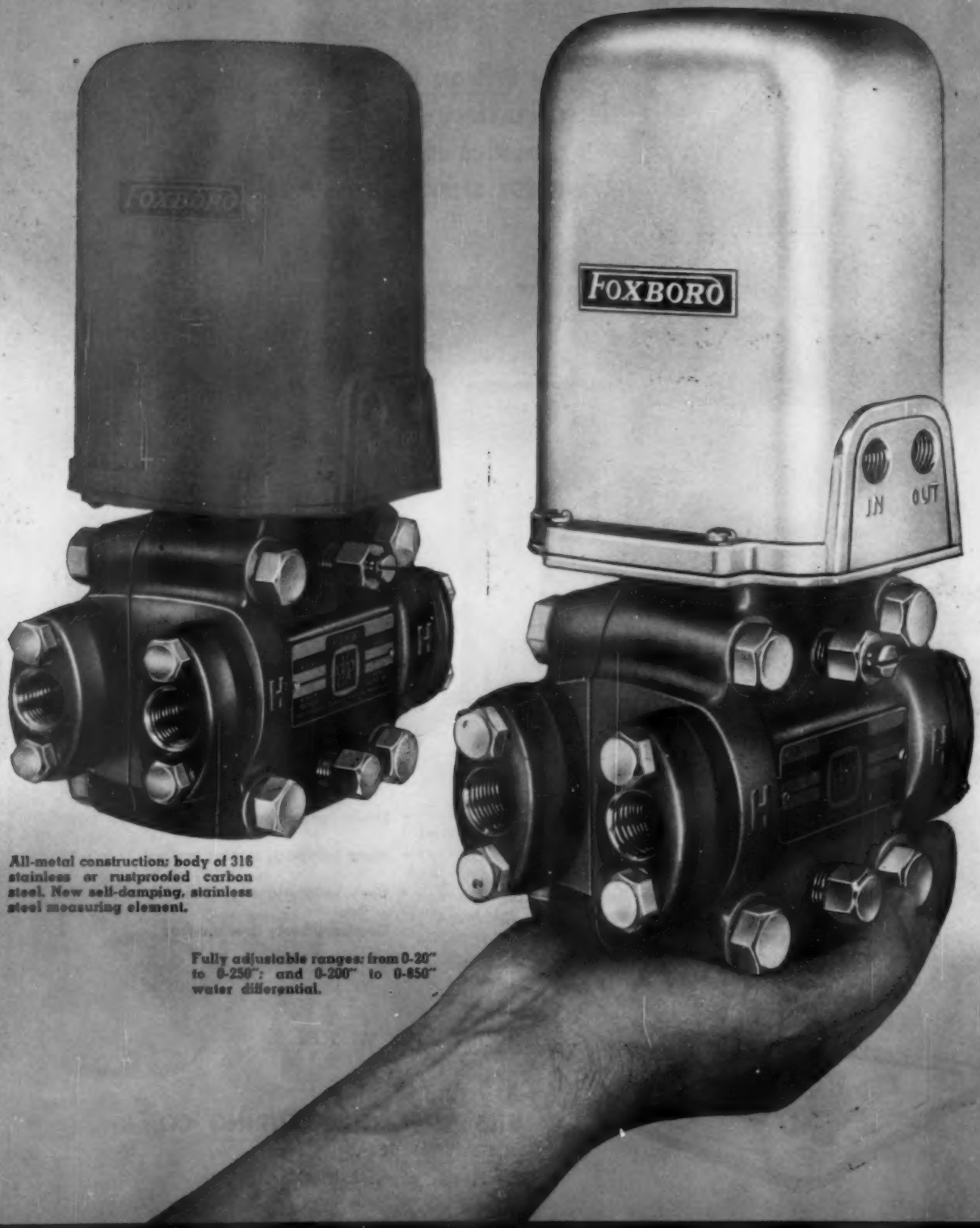
BE MODERN — BUY WILSON

Wilson

WILSON MANUFACTURING CO., Inc.
WICHITA FALLS, TEXAS
The Home of RED IRON

FLOW TRANSMITTERS...

in accuracy, stability and performance



All-metal construction: body of 316 stainless or rustproofed carbon steel. New self-damping, stainless steel measuring element.

Fully adjustable ranges: from 0-20" to 0-250"; and 0-200" to 0-850" water differential.

FOXBORO d/p CELL

unequaled –

Simplest installation — orifice flange tap connections at standard spacing, are provided at both ends.

Drain and vent holes at lowest and highest points on both sides.

Purged cover protects transmitter from weather, dust, and fumes.

Over 60,000 now in use!

No zero drift . . . positive overrange protection . . . high sustained accuracy even under the most punishing operating conditions. No wonder over 60,000 Foxboro d/p Cell Transmitters have been installed since they were introduced in 1948.

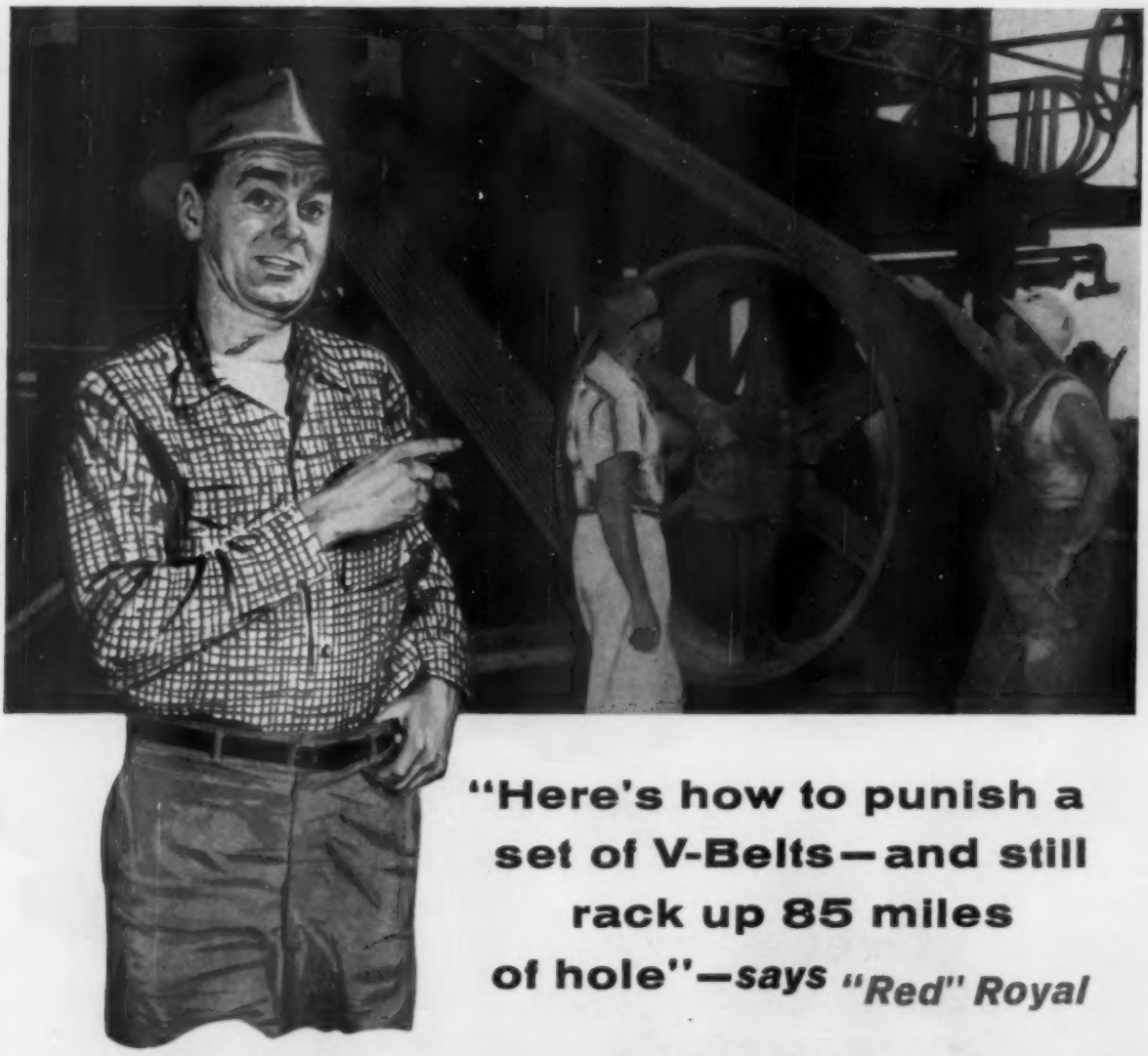
By introducing the modern concept of high speed flow measurement and control, these differential pressure transmitters have *revolutionized* many an industrial process. Bulletin 13-11A shows how — and portrays the benefits the d/p Cell Transmitter offers you. Write **The Foxboro Company, 608 Norfolk St., Foxboro, Mass., U.S.A.**

FOXBORO

REG. U.S. PAT. OFF.

FIRST in Flow Measurement and Control

US RUBBER **V-BELTS**



"Here's how to punish a set of V-Belts—and still rack up 85 miles of hole"—*says "Red" Royal*

"Red" has just been talking to the tool pusher and crew of the Holmes Drilling Co. rig #6. They're getting ready to disassemble the V-Belt drive and move it to another location. Here's what they told him:

"The hardest wear to which a V-Belt drive can be put is to be frequently dismantled and reassembled at different locations. Invariably, you run into misalignment problems until the two sheaves can be juggled into proper position. This causes the V-Belts to take a beating, which is aggravated by the number of times the drive is moved."

Yet this set of U.S. Rubber belts was on 58 different holes, drilling almost 450,000 feet—85 miles—in 5 years!

Adds the drilling superintendent: "These belts operated practically 24 hours a day. They were given only normal company maintenance. At no time did we have a major shutdown due to belt failure."

U.S. Rubber V-Belts are built for battering. That's why they turn in impressive records like this. That's why—for economy and performance—"U.S." *proves* best.

Available in all fields at supply stores.

US RUBBER **Mechanical Goods Division**

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Which Unibolt stem seat has been in corrosive gas-distillate service for 8 years?

UNIBOLT Christmas tree fittings — tees, crosses, positive chokes, adjustable wing valves — trimmed in exclusive UNIBOLT "SA" Stainless, or made entirely of this special analysis alloy, are winning the fight against corrosive fluids and gases.

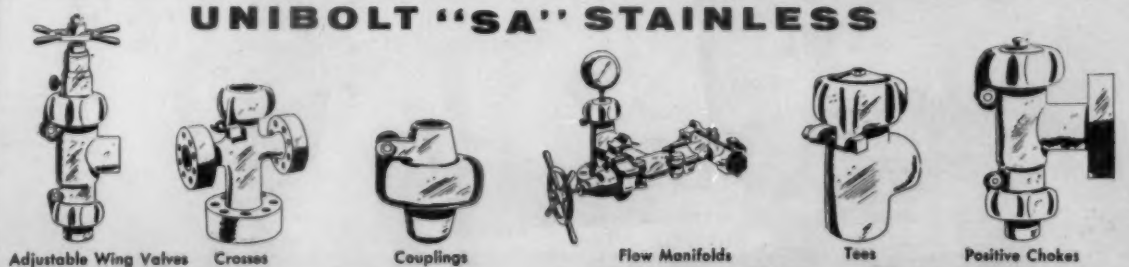
Production containing either hydrogen sulphide or carbon dioxide, or both, usually attacks and quickly destroys carbon steel and some alloy steel parts.

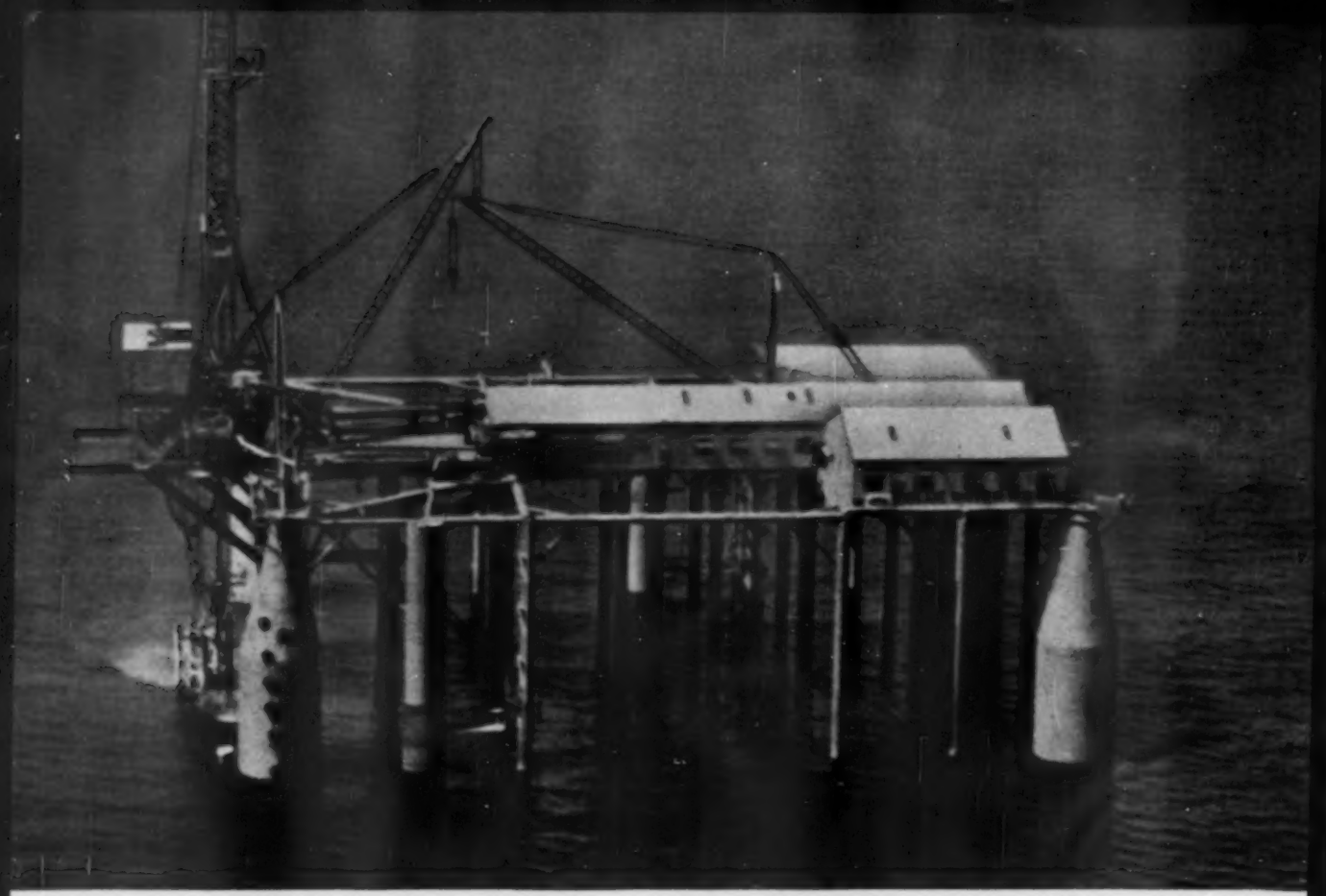
A standard UNIBOLT Adjustable Wing Valve, installed on a corrosive well in the Katy Field (Texas Gulf Coast) required replacement of the carbon steel seat in only 45 days. A UNIBOLT "SA" Stainless Valve installed at that time has shown no corrosion damage in eight years. As the above photograph reveals, the 8-year-old stem seat (right) still shows no sign of corrosion, for all practical purposes is as good as the new stem seat (left).

Got any corrosive wells? A UNIBOLT representative will gladly give you full particulars and case histories on "SA" (Special Analysis) Stainless.

THORNHILL CRAVER CO.
P. O. BOX 1184 HOUSTON, TEXAS

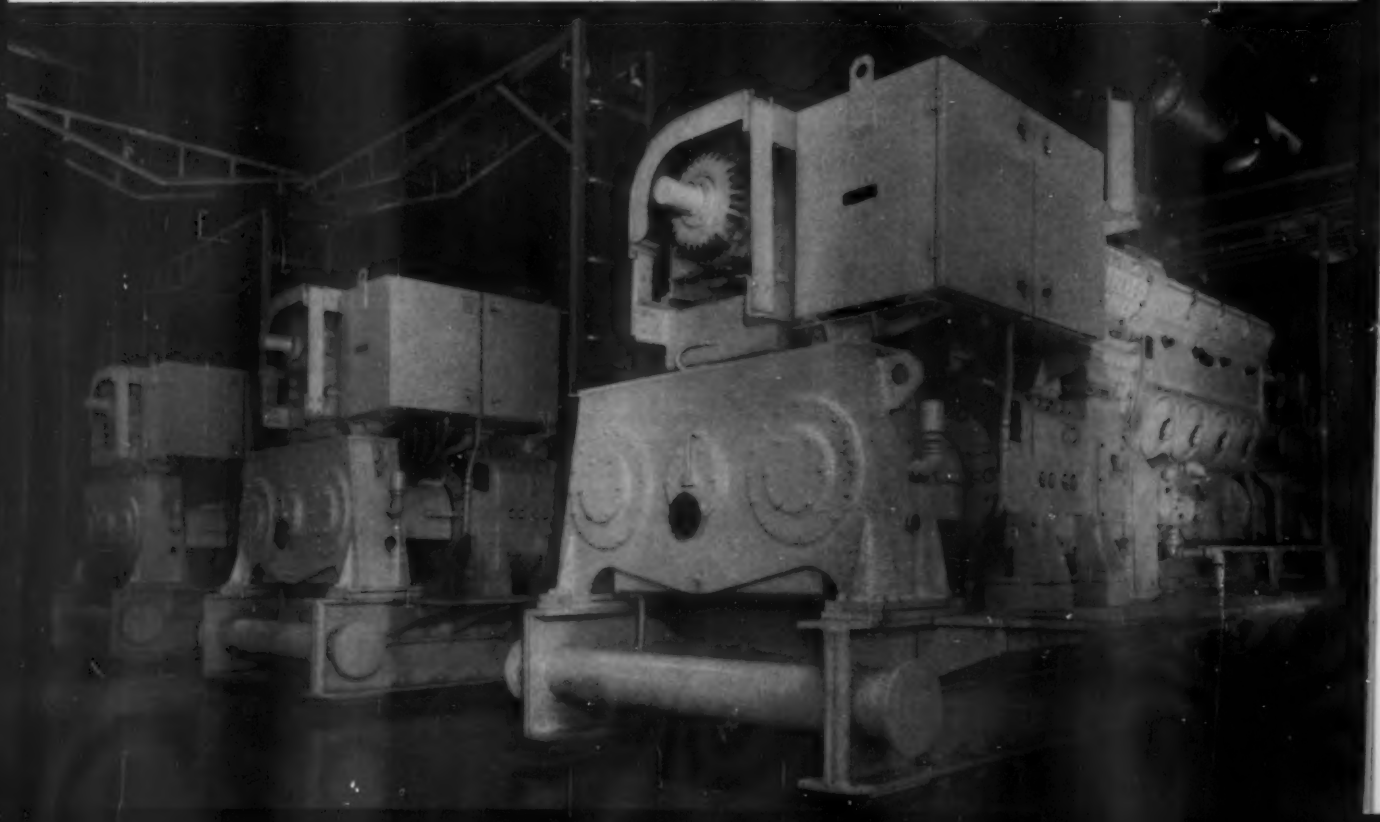
UNIBOLT "SA" STAINLESS





Blue Water Rig No. 1 was constructed by Ingalls Shipbuilding Corporation, commissioned in September, 1957. Platform measures 242′ by 202′. Unit can drill in 70′ of water.

Three 900 horsepower Electro-Motive generator sets are shown here in white-painted engine room. Each engine drives two 500 KW generators that supply power to mud pumps, rotary table and draw works.



RIG: Blue Water No. 1

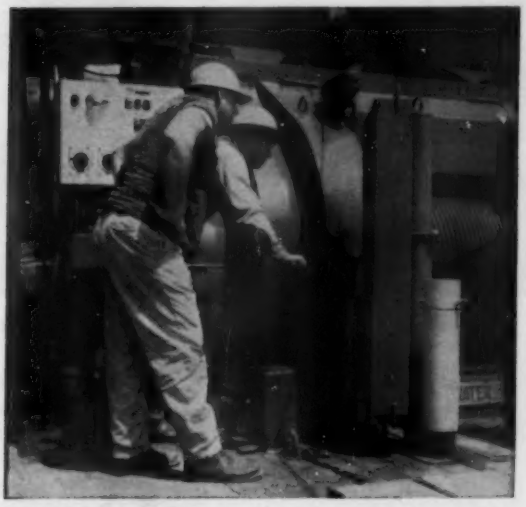
POWER: Electro-Motive

"Dependability" biggest factor in power choice

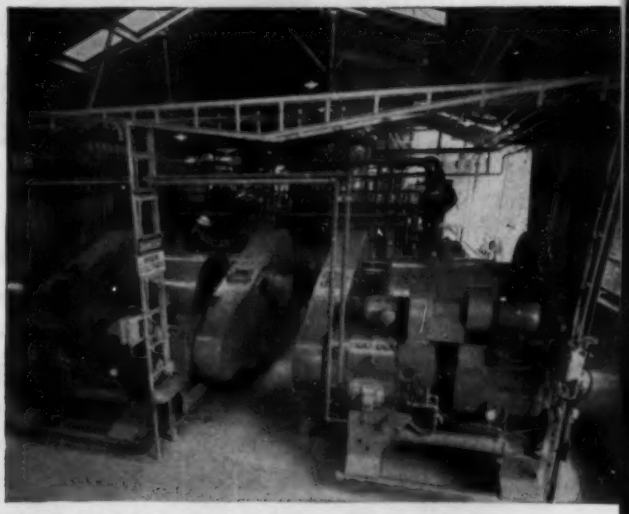
Blue Water Drilling Corporation put Electro-Motive Power in their Rig No. 1 because they knew this equipment had what they wanted: a proven record of performance under all kinds of drilling conditions; smooth, accurate, flexible power control; and only *one* manufacturing responsibility for the complete power system.

Summed up, these reasons mean just one thing—*dependability*. The stakes in offshore or deep land drilling are extremely high. Just as high are the demands on equipment. That's why a drilling company like Blue Water places the power responsibilities of their multi-million dollar rig No. 1 with Electro-Motive Power. In fact, more offshore rigs are powered with Electro-Motive Power than by any other Diesel-electric system.

If you are considering power equipment for deep land or offshore drilling, contact your Electro-Motive representative.



Control center is located beside draw works. Here, Carl Wilson, (left) Toolpusher and L. L. McMillian, Driller, watch weight indicator. Behind them is the Electro-Motive control panel which provides control of all Diesel-electric equipment.



Mud pumps are powered by 625 horsepower Electro-Motive motors. Three pumps are used. Two shown here each have two motors. Third pump has one motor. Draw works is powered by two similar drive motors.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *In Canada:* **General Motors Diesel Limited,** London, Ontario

Petroleum Industry Sales Offices: Houston, Texas; Los Angeles, California

SAVE money

SAVE manpower

SAVE maintenance

SAVE with Electric Automation

In producing fields, at pipeline stations and throughout refineries, you can save with the dependable automation of low cost Purchased Electric Power. There is nothing like Utility Electricity to give you instant, dependable power when and where you need it . . . and to give you complete automation should you require it for added savings. Let your nearest Utility Electric Power Company show you how you can save more with Purchased Electric Power . . . or write us.

Purchased Electric Power . . .
saves money, manpower, maintenance
and serves you better automatically

Petroleum Electric Power Association

P.O. BOX 35006, DALLAS 35, TEXAS

13,760 feet of USS National Seamless Casing

run in 9 hours, 10 minutes

This string was run at Lloyd Corporation's William Sexton Well No. 5, California. Top to bottom, it was made up as follows:

5,810.00 ft.	(144 lengths)	7" OD 29# National N-80 Casing with Diamond Ⓑ Buttress Threads
4,139.50 ft.	(99 lengths)	7" OD 26# National Deep-Well Casing with API L. T & C
3,810.50 ft.	(95 lengths)	7" OD 29# National Deep-Well Casing with API L. T & C
13,760.00 ft.		

All joints made up quickly and smoothly. Torque make-up for the A.P.I. threads was about 3200 foot-pounds; for the Diamond Ⓑ Buttress Threads, it was about 3600 foot-pounds.

Remember—for Casing, Drill Pipe and Tubing that will consistently give you the most service for every dollar invested, always specify USS NATIONAL Seamless—"Walls Without Welds."

USS, National and Ⓑ are registered trademarks

Here are some of National Tube's most notable contributions to the oil industry:

National Deoxidized Bessemer Steel Casing and Tubing—GRADES H-40, J-55. Especially well suited for oil production because of its combination of high yield strength and good ductility.

National Warm-Worked Casing—GRADE N-80. An extremely high-strength casing possessing a uniformity of physical properties which gives it high collapse resistance and greatly increased joint strength. It is hydrostatically tested to 80% minimum yield strength up to a maximum of 10,000 psi.

National Deep-Well Casing A casing made to API standards to meet constantly increasing depths. Due to the severe service for which it is intended, it is hydrostatically tested to 80% minimum yield strength up to a maximum of 12,000 psi.

National Ⓑ Buttress Thread Developed to satisfy the need for a casing joint which will safely and economically support the weight of deep-well casing. The buttress-thread joint is comparable in strength to that of the body of the pipe.

For further information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

"The world's largest and most experienced producer of tubular products —NATIONAL TUBE"

National Tube Division of United States Steel

United States Steel Export Company, New York

THE PARKERSBURG RIG AND REEL CO.
PARKERSBURG WEST VIRGINIA
QUALITY SERVICE
MADE IN U.S.A.

QUALITY and PERFORMANCE

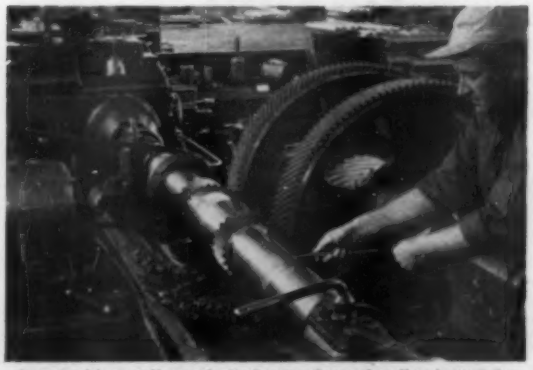
are Engineered and Built into PARKERSBURG Pumping Units

The dependability that makes Parkersburg Pumping Units top choice in the field begins on the drawing board and continues through all manufacturing steps. Here are typical shop scenes showing why you can depend on quality-built Parkersburg Pumping Units with herringbone gear reducers.

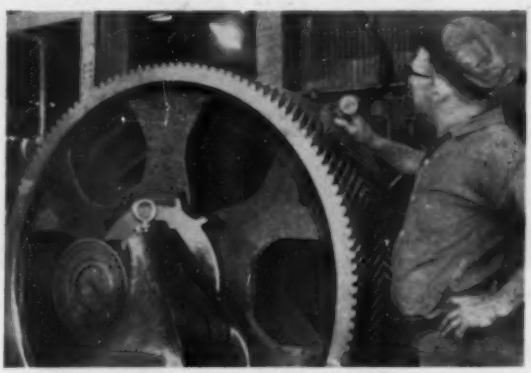
Quality Control from Design to Completed Pumping Unit Makes a PARKERSBURG

YOUR BEST BUY

Inspector checking ground shaft for accuracy. Parkersburg Pumping Units are made to exacting specifications.

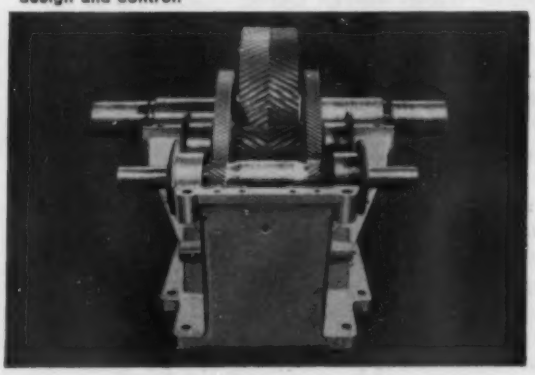


Constant inspections at all stages of construction insure dependability. Inspector here is checking centers on lapping machine.



Checking gear teeth with comparator gauge. This assures proper angle for strength and freedom from undercutting.

Interior of "split case" reducer showing symmetrical arrangement of gears about centerline of reducer, a product of quality design and control.



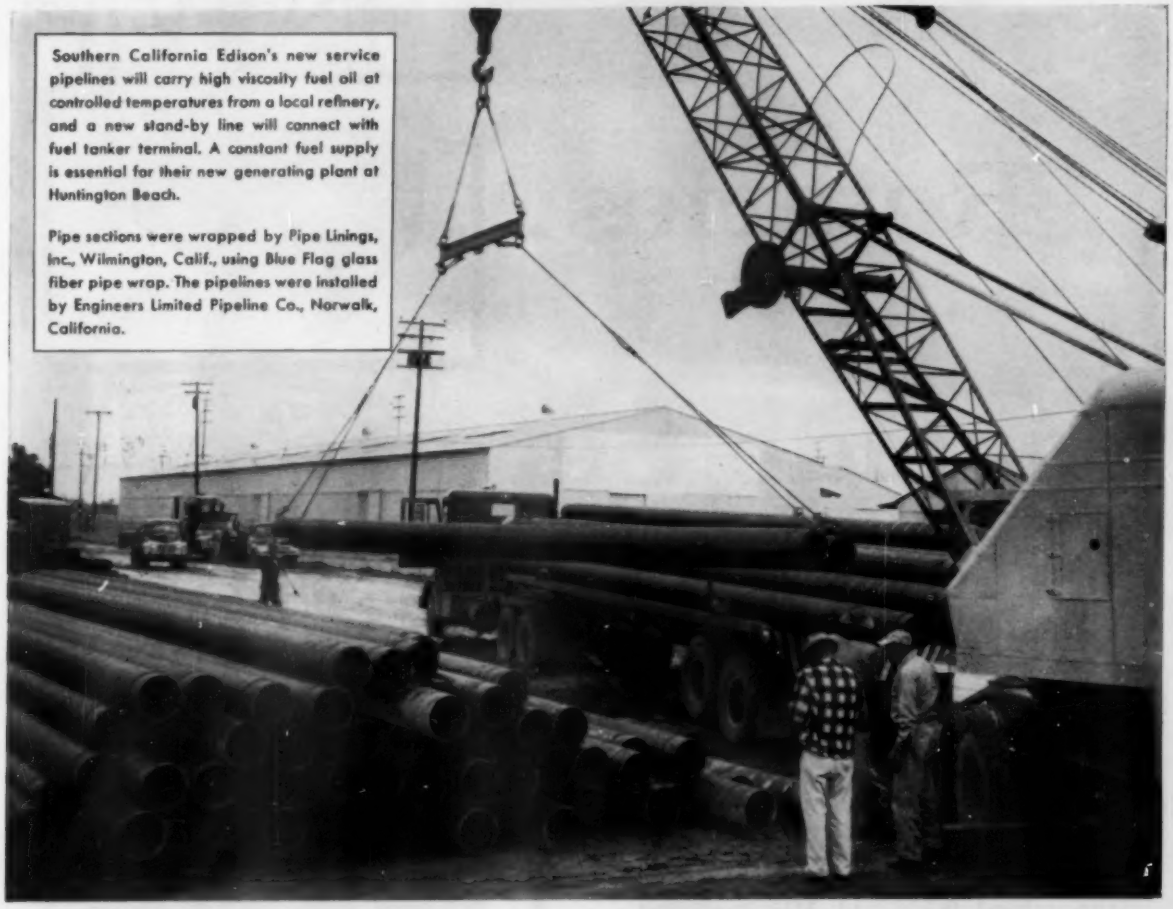
THE PARKERSBURG RIG & REEL COMPANY
Division of Parkersburg-Aetna Corp.
PESA
Pumping Unit Division Offices:
710 Mid-Continent Building Tulsa, Oklahoma

Parkersburg Pumping Units are available through the following supply stores:

Beacon Supply Co., Bovaird Supply Co., Canadian Equipment Sales & Service Co., Ltd., C. W. Cotton Supply Co., Franklin Supply Co., Houston Oilfield Material Co., Inc., Industrial Supply Co., Iverson Supply Co., Midland Supply Co., Inc., Mountain Iron and Supply Co., Murray-Brooks, Inc., The Producers Supply & Tool Co., Rodman Supply Co., Superior Iron Works & Supply Co., United Supply & Manufacturing Co., Wilson Supply Co.

BLUE FLAG® SAFEGUARDS PIPELINE INVESTMENT

for Southern California Edison's New Plant



Southern California Edison's new service pipelines will carry high viscosity fuel oil at controlled temperatures from a local refinery, and a new stand-by line will connect with fuel tanker terminal. A constant fuel supply is essential for their new generating plant at Huntington Beach.

Pipe sections were wrapped by Pipe Linings, Inc., Wilmington, Calif., using Blue Flag glass fiber pipe wrap. The pipelines were installed by Engineers Limited Pipeline Co., Norwalk, California.

One of the prime considerations in securing the best possible protection for your pipeline investment is specifying the *right* reinforcing pipe wrap for your enamel coating.

Blue Flag assures many added years of dependable service with protection against:

Soil Stress—Blue Flag, made from high-strength inert glass fibers, effectively reinforces the enamel coating to withstand soil stress, and the damaging effect of soil chemicals.

"Holidays"—Blue Flag's uniform porosity allows hot enamel to bleed; trapped gas to escape quickly.

Backfill Damage—Blue Flag strengthens protective enamel to resist impact damage and cracking.

For long-lasting, low-cost protection, insist on Blue Flag Reinforcing Pipe Wrap and Duramat Outer Pipe Wrap. Applied over the reinforced enamel, Duramat provides a tough skin, protecting the enamel from mechanical damage during handling, lowering-in and back-filling.

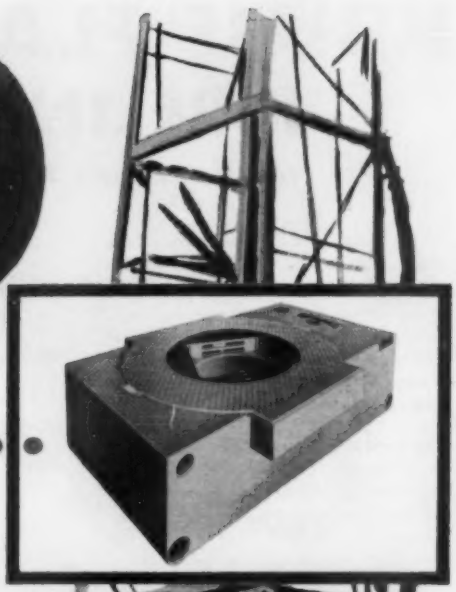
Every day more and more corrosion engineers and pipeline executives are specifying "Blue Flag" for yard, mill and over-the-ditch jobs.

Want More Facts? Write: *L·O·F Glass Fibers Company*
Dept. 78-88, 1810 Madison Ave.
Toledo 1, Ohio

L·O·F GLASS FIBERS

L·O·F GLASS FIBERS COMPANY TOLEDO 1, OHIO

Rope...



Rotaries...

Rigside Service

from Mid-Continent where and when you need them....

Around the clock... you can depend on Mid-Continent for prompt field service in supplying your rig with thousands of items carried in stock at your local Mid-Continent field store. In oil areas throughout the world, Mid-Continent has experienced personnel... plus complete stocks of top-quality products... to help oil operators and drilling contractors keep rigs running at maximum efficiency. Visit your nearest Mid-Continent Field Store, or call your local Mid-Continent representative.

MID-CONTINENT SUPPLY CO.

MID-CONTINENT BUILDING • FORT WORTH, TEXAS

Export Division: 45 Rockefeller Plaza, New York 20, N. Y. Cable: MIDCUMPORT NYK

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

This 60' x 100' Rigid Frame pipeline supply warehouse has 16' x 18' overhead door for entry of largest trucks.

WANT A BUILDING WITH NO WASTE SPACE?

The Rigid Frame is it! Made by Stran-Steel,* this modern steel building is free of columns, low in cost and custom-tailored to your specifications.

USES: Clear-span, wall-to-wall oil field warehousing and storage, rugged service or laboratory facilities, field offices or pipeline stations.

MATERIALS: All-steel construction. Attractive *Stran-Satin* wall and roof-panels blend well with other building materials.

SIZES: Choice of six widths from 32′ to 80′ and multiples. Lengths in 20′ multiples.

FEATURES: Column-free interiors for efficient materials handling and plant layout. Speedy erection. Low maintenance. Fire safety.

COST: Low, because Stran-Steel structures are mass-produced. Easily financed through dealer with 25% down, 5 years to pay.

For full information, mail the coupon or contact your own Stran-Steel dealer. He's listed in the Yellow Pages under *Steel Buildings* or *Buildings—Steel.*

*The complete line of Stran-Steel buildings also includes the low-priced Stran-Master all-steel pole-type building.

Dept. 41-44

STRAN-STEEL CORPORATION

Detroit 29, Michigan • Division of

NATIONAL STEEL CORPORATION

Stran-Steel Corporation, Dept. 41-44
Detroit 29, Michigan

Please send your Industrial Buildings Catalog.

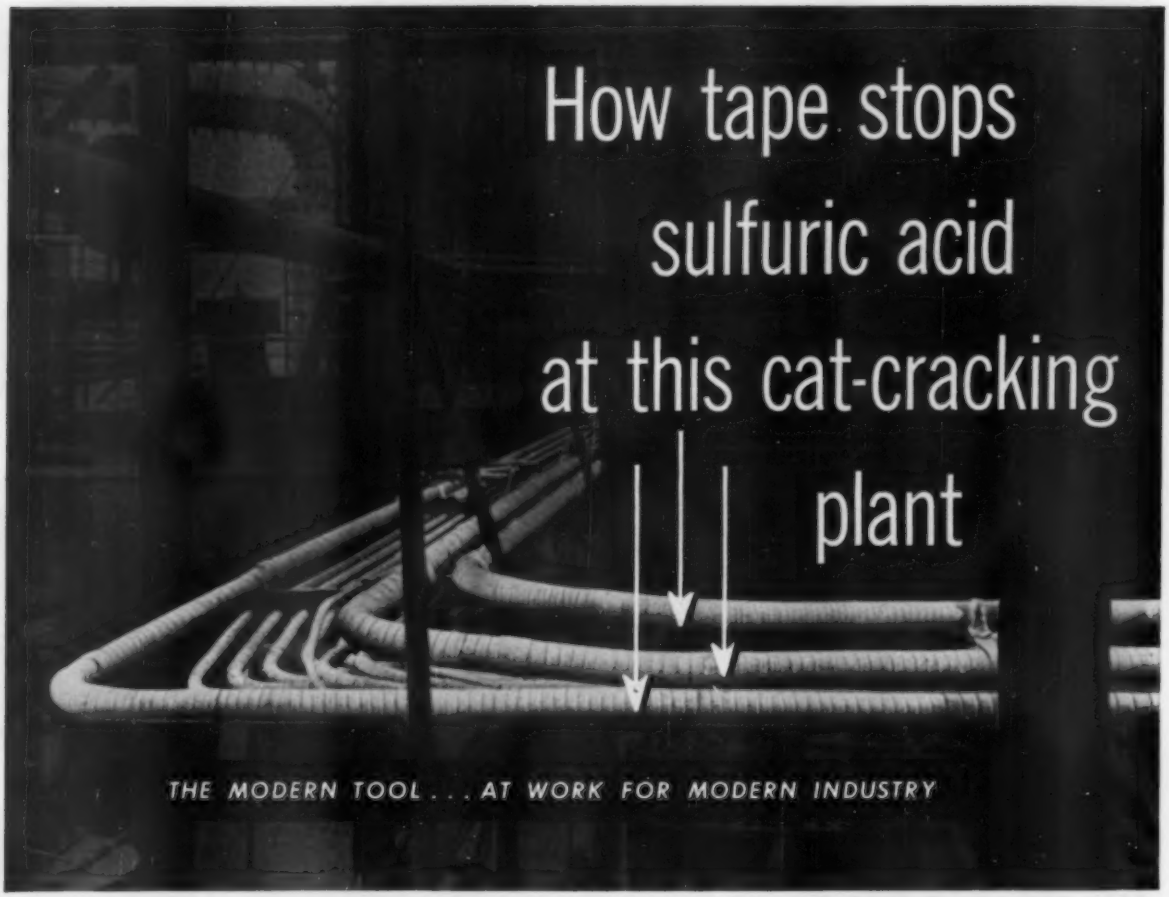
Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State____



FIVE YEARS UNDER THESE HIGHLY CORROSIVE CONDITIONS PROVES THAT POLYKEN PROTECTION WORKS . . . *TO TRIM COSTS*

Look in on one of the world's largest fluid catalytic cracking units. A maze of conduit and pipe exposed to an extremely corrosive sulfuric acid atmosphere.

Formerly, these structures had to be painted every three or four months. Maintenance costs were excessive. Then, five years ago, they were wrapped with Polyken Protective Tape Coating. They have needed practically no attention since.

INERT POLYETHYLENE

The reason is that Polyken takes amazingly inert polyethylene and makes it into a tape coating with all these properties.

- **tough and elastic**
- **unplasticized, non-drying film**
- **doubly thick adhesive to seal all voids**
- **far higher adhesion for a true bond to pipe surface**
- **lower water vapor transmission rate**
- **higher electrical insulation resistance**
- **better cold weather handling and durability**

Check the savings. Contact the Polyken distributor in your area.

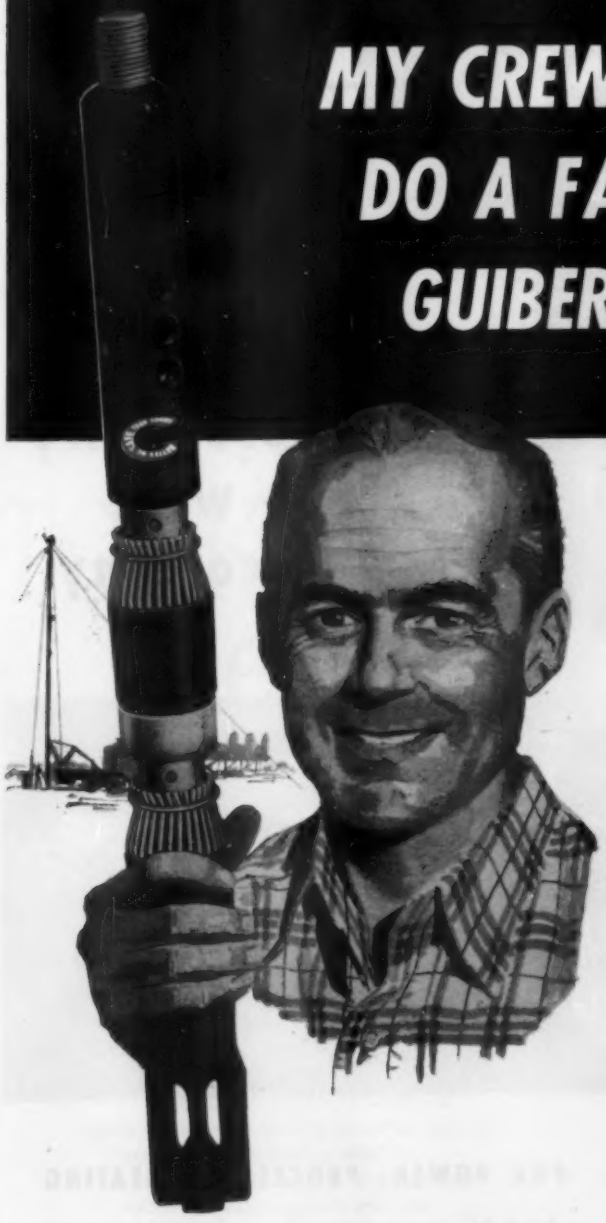
Atlanta, Georgia: Steele & Associates, Inc.
Chicago, Ill.: Sales Engineering, Inc.
Cincinnati, Ohio: Hare Equipment
Cleveland, Ohio: The Harco Corp.
Denver, Colo.: Patterson Supply Co.
Des Moines, Ia.: The Donald Corp.
Fort Worth, Texas: Plastic Engineering & Sales Corp.
Gretna, La.: Allen Cathodic Protection Co.
Houston, Texas: Cathodic Protection Service
Kansas City, Mo.: Industrial Coating's Engineering Co.
Long Beach, Calif.: Barnes & Delaney
Minneapolis, Minn.: Simcoe Equipment Co.
Philadelphia, Pa.: Harold N. Davis Co.
Pittsburgh, Pa.: Royston Laboratories, Inc.
Plainfield, New Jersey: Stuart Steel Protection Corp.
St. Louis, Mo.: Shutt Process Equipment Corp.
San Francisco, Calif.: Aetna Sales Co.
Seattle, Wash.: Farwest Corrosion Control Corp.
Seattle, Wash.: Pacific Water Works Supply Co.,
Tulsa, Okla.: William Cluff Corp.

Polyken®

Experienced in modern PROTECTIVE COATING

THE KENDALL COMPANY
Polyken Sales Division

MY CREWS DO A FASTER JOB with GUIBERSON SWABS



There's no substitute for a fast-falling, smooth-pulling Guiberson swab in speeding-up swabbing operations. Crews make fewer trips .. do a better clean-out job .. lift more fluid per hour. So naturally they're in and out quicker .. at the *lowest possible* swabbing cost. Match one of these cups to your swabbing job.

TYPE J .. lifts heaviest loads

TYPE L .. lifts medium or light loads

TYPE GW .. for light loads

TYPE K .. general purpose cup to 6,000 feet

SIMPLEX .. lifts fluid containing suspended sand

More than a third of a century of swab-making experience is behind each Guiberson swab and cup. No matter what type of production .. shallow or deep .. light or heavy loads .. smooth, rough or tight tubing .. you will pull more fluid with Guiberson swabs and cups. Regardless of your swabbing problem, you can meet it .. solve it .. quicker and cheaper with a Guiberson swab.

Cups are compounded to Guiberson's exclusive formulas for maximum resistance to oil .. acid .. abrasion.

SAFE THAN SORRY — BETTER BE GUIBERSON

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by
Oil Field Supply Stores
Everywhere

Vogt

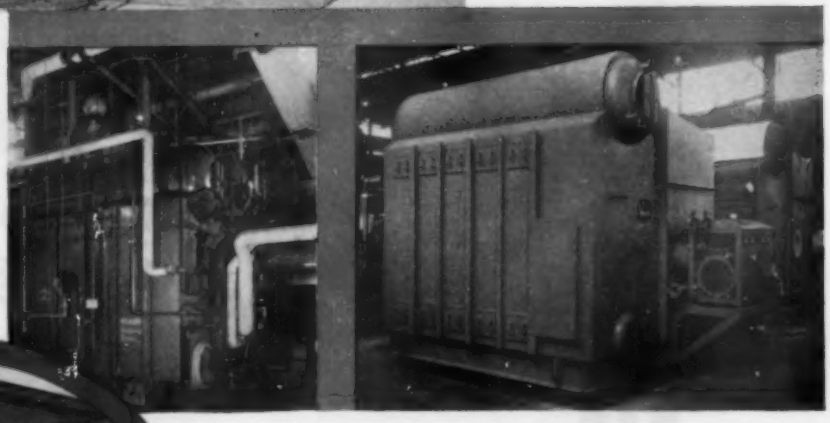
Package

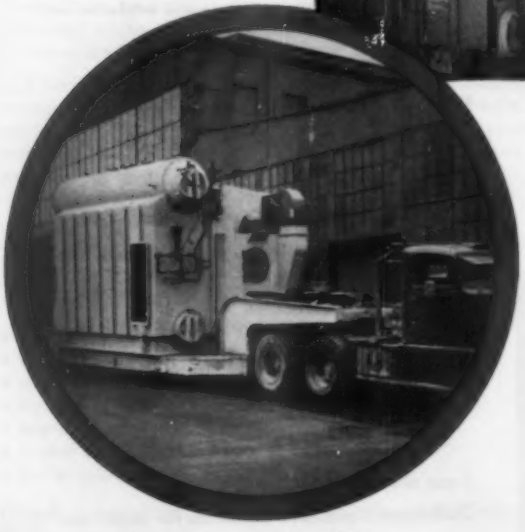
STEAM BOILERS *give* versatility with economy

Above: Two units serve a gas pipeline company.

Left: Installation in fibre boxboard plant.

Right: Unit for a leading soap manufacturer.





Enroute to an office building.

FOR POWER, PROCESS OR HEATING

Available in capacities from 10,000 to 50,000 pounds steam per hour in three standard pressures of 175, 250 and 375 pounds per square inch gage, factory assembled.

Write for Bulletin PSG-2, Dept. 24A-BO

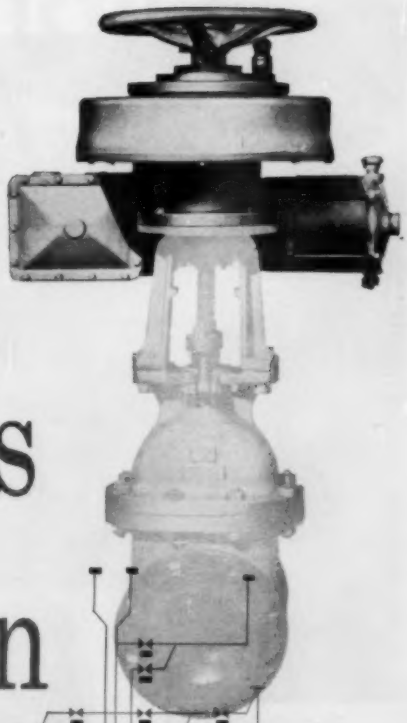
HENRY VOGT MACHINE COMPANY, Louisville, Ky.

SALES OFFICES: New York, Chicago, Cleveland, Dallas, Camden, N. J., St. Louis, Charleston, W. Va., Cincinnati.

OTHER VOGT PRODUCTS:

DROP FORGED STEEL VALVES, FITTINGS, FLANGES AND UNIONS
PETROLEUM REFINERY AND CHEMICAL PLANT EQUIPMENT
HEAT EXCHANGERS • ICE MAKING & REFRIGERATING EQUIPMENT

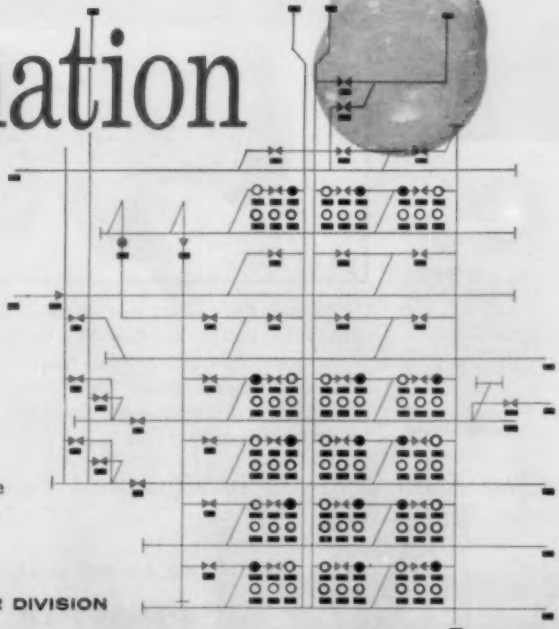
manual valves plus TORK-MASTER electric valve operators equal automation



TORK-MASTER makes *manual* valves *automatic!* Even more important, TORK-MASTER converts a manual operation to an automatic operation *without removing valves during changeover.*

And there's nothing complicated about this electric valve operator.

Its efficient, simple design assures you of low original cost, low maintenance cost and minimum circuitry to master control panel. You get complete flexibility in operation whether you go to total automation or merely wish to provide a limited remote control function. For case histories, full data on TORK-MASTER, write today to:



TORK-MASTER DIVISION

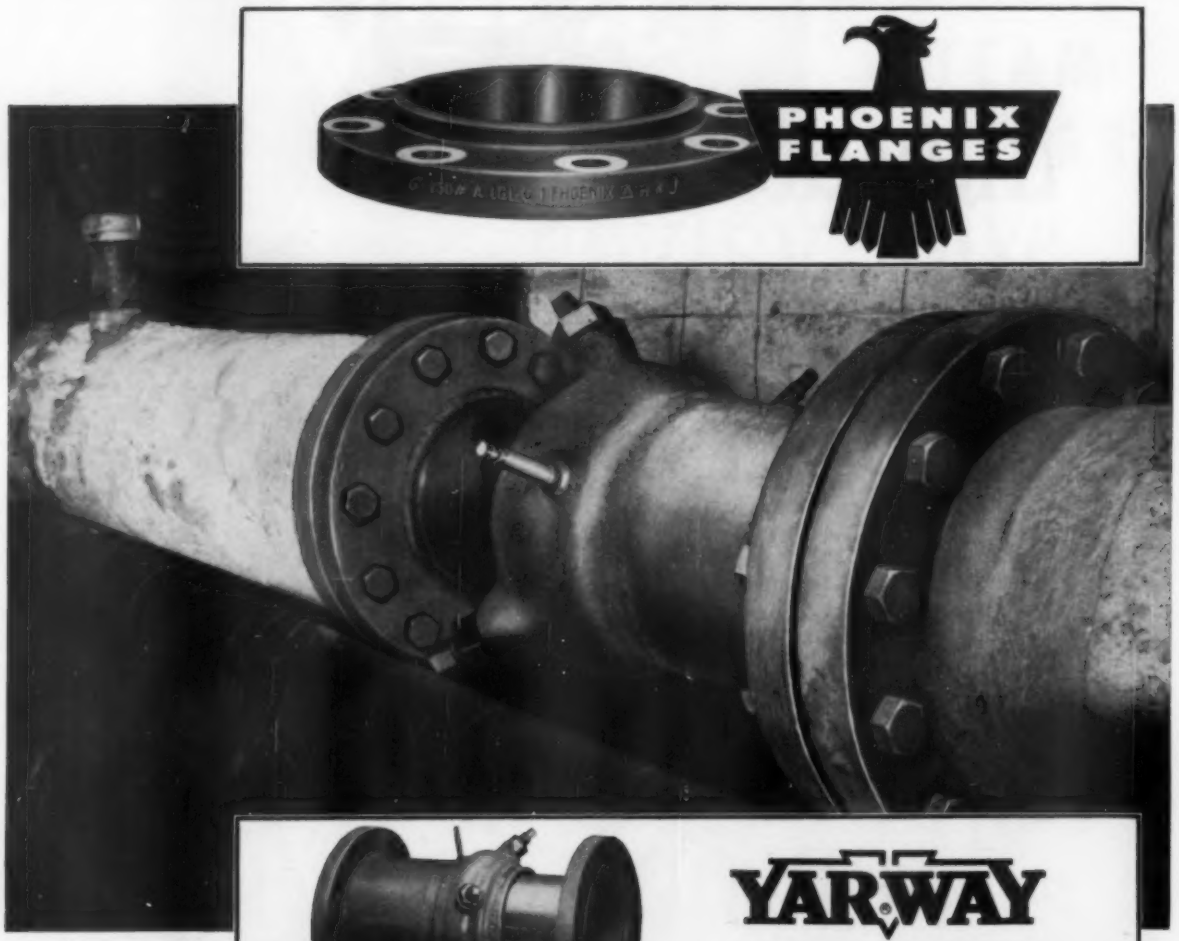
GENERAL CONTROLS

America's Finest Controls for Home, Industry, and the Military

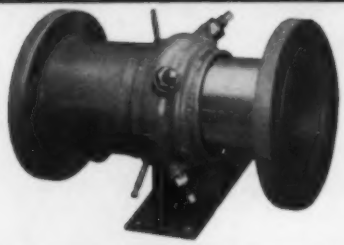
Glendale, California • Skokie, Illinois • Guelph, Ontario, Canada

Six Plants—42 factory branch offices serving the United States and Canada

TWO QUALITY PRODUCTS TEAMED FOR AN EFFICIENT INSTALLATION



Write for free 36-page pocket reference booklet



YARWAY

GUN-PAKT EXPANSION JOINTS

Because there is no need to shut down for repacking, the Yarway Gun-Pakt is one of the most popular expansion joints used in modern steam distribution lines. The Yarway joint is built for long service, with never any danger of metal fatigue or failure.

There must be no failure at flanged connections, either. That's why Yarnall-Waring Co. uses Phoenix forged-steel flanges on Gun-Pakt expansion joints.

Like Yarnall-Waring, you, too, will find that *you can't buy better flanges*. May we demonstrate the advantages of Phoenix service?

Leading Manufacturers of Pipe and Tank Flanges and Commercial Forgings

PHOENIX

FLANGE AND FORGING DIVISION

PHOENIX MANUFACTURING COMPANY

CATASAUQUA, PA. · JOLIET, ILL. · FOUNDED 1862

Integrated Manufacturing Facilities: FLANGE AND FORGING DIVISION, STEEL MILL DIVISION, HORSESHOE PRODUCTS DIVISION, RUBBER PRODUCTS DIVISION

Don't pay today's prices for yesterday's engines!

Read on following pages how the new Worthington SLHC engine compressor can substantially reduce your gas handling costs

Only SLHC Turbocharged Gas-Worthington offers all these

MODERN DESIGN

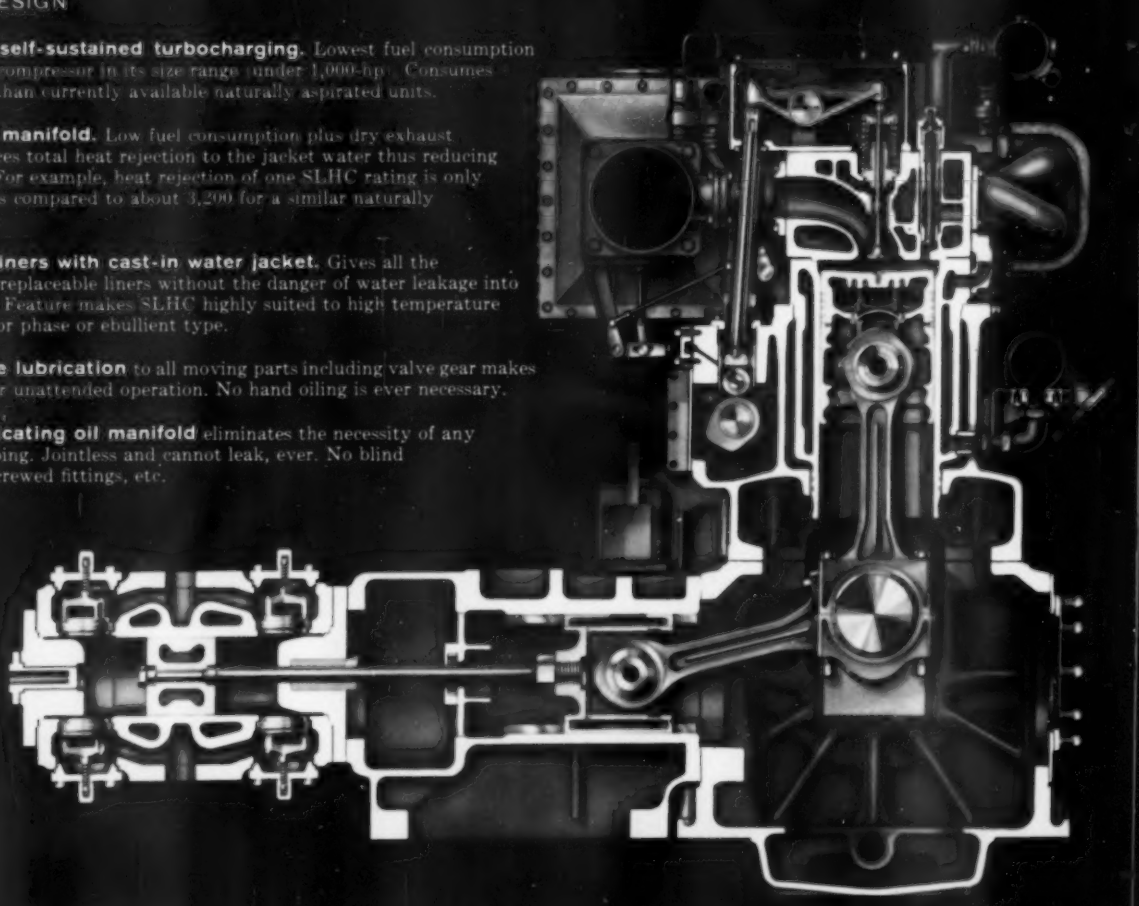
Completely self-sustained turbocharging. Lowest fuel consumption of any engine compressor in its size range (under 1,000-hp). Consumes 20% less fuel than currently available naturally aspirated units.

Dry exhaust manifold. Low fuel consumption plus dry exhaust manifold reduces total heat rejection to the jacket water thus reducing radiator size. For example, heat rejection of one SLHC rating is only 2,015 BTU's as compared to about 3,200 for a similar naturally aspirated unit.

Removable liners with cast-in water jacket. Gives all the advantages of replaceable liners without the danger of water leakage into the crankcase. Feature makes SLHC highly suited to high temperature cooling of vapor phase or ebullient type.

Full pressure lubrication to all moving parts including valve gear makes SLHC ideal for unattended operation. No hand oiling is ever necessary.

Cast-in lubricating oil manifold eliminates the necessity of any internal plumbing. Jointless and cannot leak, ever. No blind connections, screwed fittings, etc.



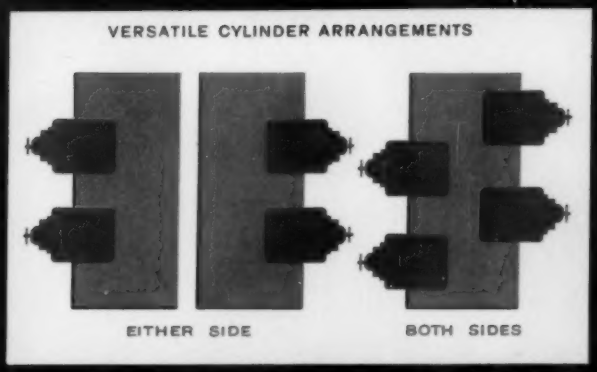
Six-cylinder SLHC unit installed by Northern Natural Gas Co. in the Oklahoma Panhandle.

One of three 6-cylinder skid-packaged SLHC units being prepared for shipment to Bolivia, S. A.

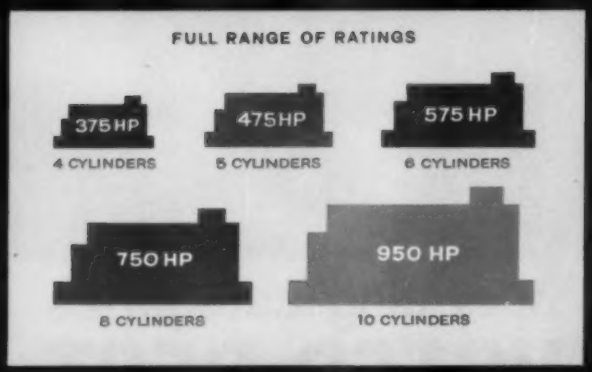
Six-cylinder skid-packaged SLHC unit for service in a Louisiana gas field.

Engine Compressor by modern, dollar-saving features

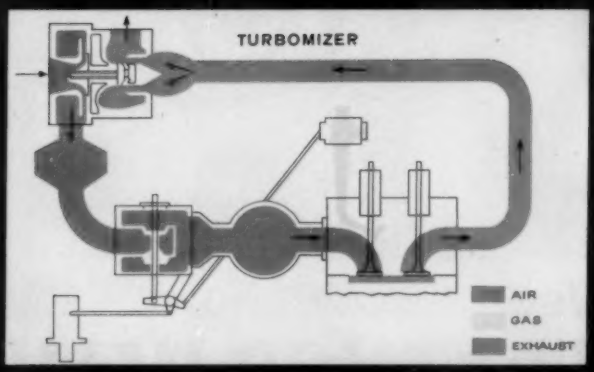
The SLHC will give you about 20% better fuel economy than currently available naturally aspirated units. This chart shows the savings per year for each 1000 hp of continuous operation on natural gas.



Piping and construction problems can be greatly simplified thanks to versatility of cylinder arrangements on SLHC. Cylinders can be mounted on either or both sides. If mounted on both sides, SLHC permits twice as many cylinders as most engine compressors in its size range.



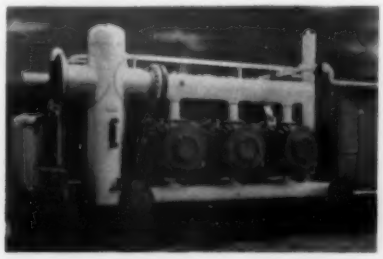
These are the range of ratings offered in the SLHC. Note that all units operate at the conservative speed of 450 rpm with a conservative bmep of under 135 psi. All units may be skid "packaged" —including the 950 hp rating, the largest available for this type service.



Worthington's Turbomizer is the simplest fuel control system on the market. It offers remarkably favorable fuel consumption and stable operation over the complete load and speed range. Allows operator to compensate for different fuels and heating values in one adjustment.

One of two 4-cylinder SLHC engine compressors to be installed by Permian Basin Pipeline Co. in Lea County, N. M.

Six-cylinder skid-packaged SLHC gas-engine compressor for a Texas natural gasoline pant.



For complete details, get in touch with your nearest Worthington district office. Or write to Worthington Corporation, Section 43-1, Harrison, N. J. In Canada: Worthington Canada Ltd., Brantford, Ont.

WORTHINGTON

User-survey shows—in all operating categories

FEATHER VALVE VOTED BEST

Simplest Construction:

FEATHER VALVE

VALVE A

VALVE B

Most Efficient:

FEATHER VALVE

VALVE A

VALVE B

Lowest Maintenance:

FEATHER VALVE

VALVE A

VALVE B

Quietest:

FEATHER VALVE

VALVE A

VALVE B

A recent survey among compressor users showed this marked preference in all four operating categories for the amazing Feather* Valve. The Worthington Feather Valve is the lightest, fastest-acting compressor valve available. Because of its lightness and flexibility it provides very sharp action with virtually no slip or back-flow. And because it works with no impact . . . has no buffer plates or cushioning devices . . . it is all but indestructible, assures long-life with negligible maintenance costs.

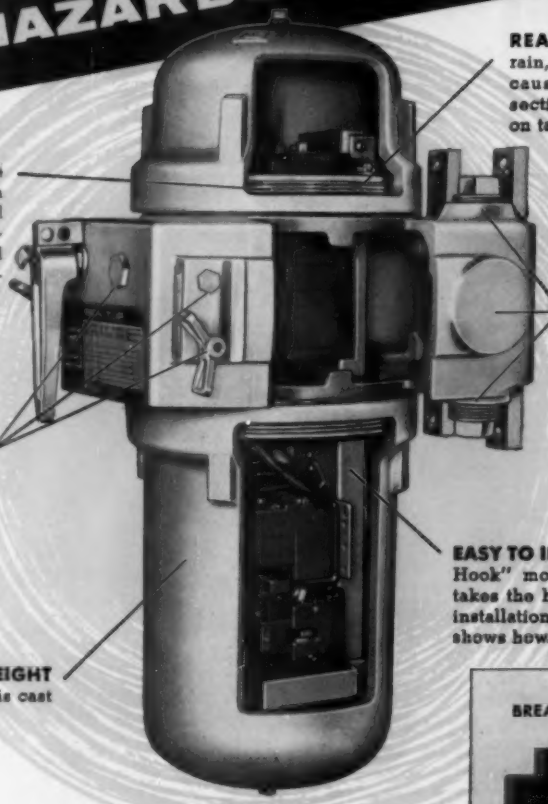
To get the most in performance when you buy your next compressor, specify Worthington with the rugged Feather Valve feature. Worthington Corporation, Harrison, N. J.

*REG. U.S. PAT. OFF.

WORTHINGTON

Square D announces...

NEW SPIN TOP ENCLOSURE FOR HAZARDOUS LOCATIONS



REAL PROTECTION against rain, dust, dirt and weather because male threads on collar section engage female threads on tank.

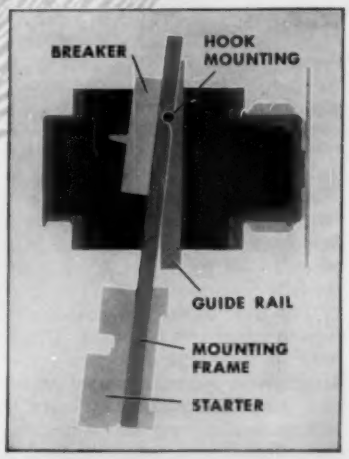
DAMAGE-RESISTING Acme thread. If you've struggled with "banged-up" threads, you'll appreciate this feature. It's always a breeze to put on and take off tanks for installation, inspection or maintenance.

INCREASED WIRING SPACE and through-feed conduit entrances for horizontal tap-offs.

EASY TO ADD pushbuttons or selector switches with easy-to-buy, easy-to-use "off-the-shelf" parts kits.

EASY TO INSTALL • "Slide and Hook" mounting arrangement takes the hard work out of the installation job. Diagram below shows how.

STRONG and LIGHTWEIGHT The complete enclosure is cast aluminum.



SLIDE and HOOK MOUNTING

4 SIZES FOR STARTERS SIZE 0 THROUGH 5

CLASS I, GROUP C and D • CLASS II, GROUP E, F, and G

The new **SPIN TOP** enclosure is available from your Square D Distributor in three ways—complete device, enclosure only, or components only...for reversing and non-reversing across-the-line starters and combination starters. And for combination and non-combination two-speed starters.

Write FOR BULLETIN 9990

Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

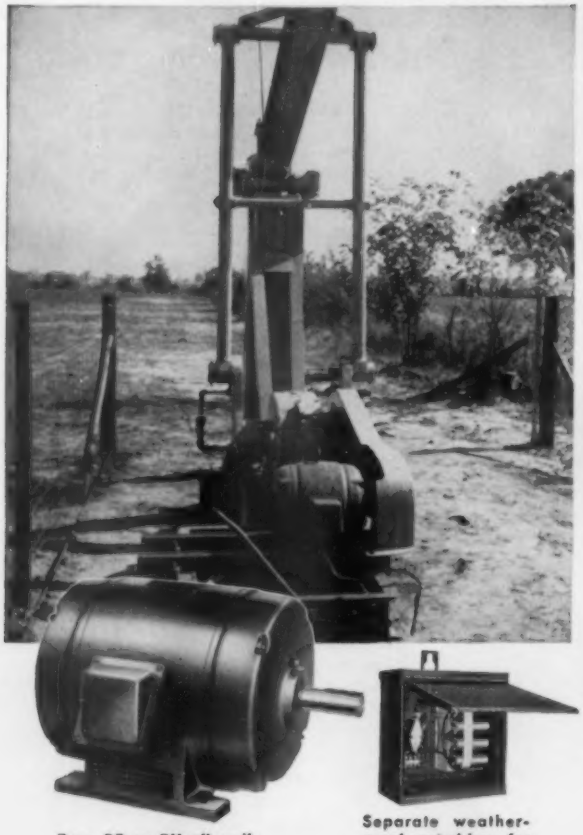
EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

These Wagner Motors are designed to

Cut Operating Costs

in the oil fields

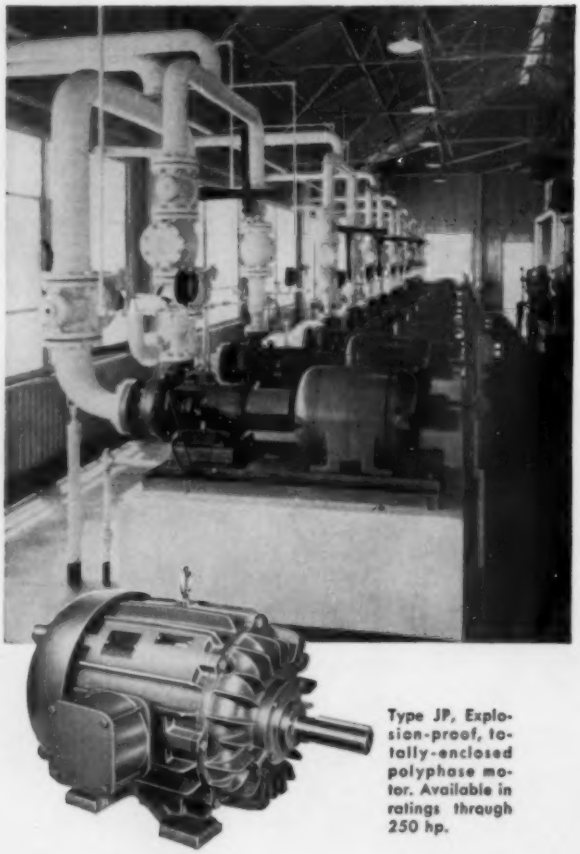


Type DP or DY oil well pumping motor. Single phase or polyphase.

Separate weatherproof control box, for use with single phase motors.

Wagner oil well pumping motors are especially designed for cost-cutting year round, maintenance-free, rugged outdoor service. They are protected against rain, sand, snow, by an enclosure that is completely dripproof—virtually splashproof. They are protected against corrosion by cast iron frames and endplates. Conduit boxes are moistureproof and dust-tight. They are available from stock in your immediate area for either polyphase or single phase operation. Single phase motors are of the high power factor capacitor start and run type with a separate weatherproof control box that contains the starting and running capacitors and voltage relay.

in the refinery



Type JP, Explosion-proof, totally-enclosed polyphase motor. Available in ratings through 250 hp.

You cut costs when you install Wagner Type JP Explosion-proof motors in your refinery because these totally-enclosed motors have extra protection that means longer motor life with little maintenance—the vital parts of the motor are sealed against the entrance of dust, fumes and moisture that are the causes of most motor maintenance problems. These motors are approved for Class 1, Group D hazardous locations, and can be used indoors or in exposed outdoor locations where corrosion is a problem. Totally enclosed fan-cooled motors are available in ratings through 400 hp.

For full information, write for Bulletins MU-132 and MU-137, or phone a nearby Wagner branch.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

WM58-3

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

keep 'em turning to the right . . .

Type "C" Drill Collar Slips

Use Safe, Sure-grip BAASH-ROSS Slips

Running tubular goods with Baash-Ross Slips helps keep your operation safely "turning to the right." Each type, specially designed to hold a particular kind of pipe, grips tightly and evenly with no danger to pipe, crew or other equipment.

Type "DU" Rotary Slips in regular and long types can be adapted to run pipe on any depth well. Replaceable, segmented liners with small truncated pyramid wickers transfer all stresses of supporting pipe directly to slip body. Three basic body sizes will hold any pipe from 2⅜" O.D. through 7" O.D. through the use of interchangeable liner sizes.

Light, safe, and easy to handle Type "C" Drill Collar Slips have long, narrow, multiple segments individually hinged to freely conform to the drill collar and bushing surface. Drill Collar slips are made for all sizes of drill collars—from 3" diameter, to and including 10" diameter, in 5 basic body sizes. Body extensions provide a Safety Clamp seat and the carefully heat-treated alloy steel liners are easily replaceable.

Type "DU" Rotary Slips

For full information see Composite Catalog or write Dept. B 8-11, P. O. Box 1348, Houston 1, Texas.

BAASH-ROSS DIVISION
OF JOY MANUFACTURING COMPANY

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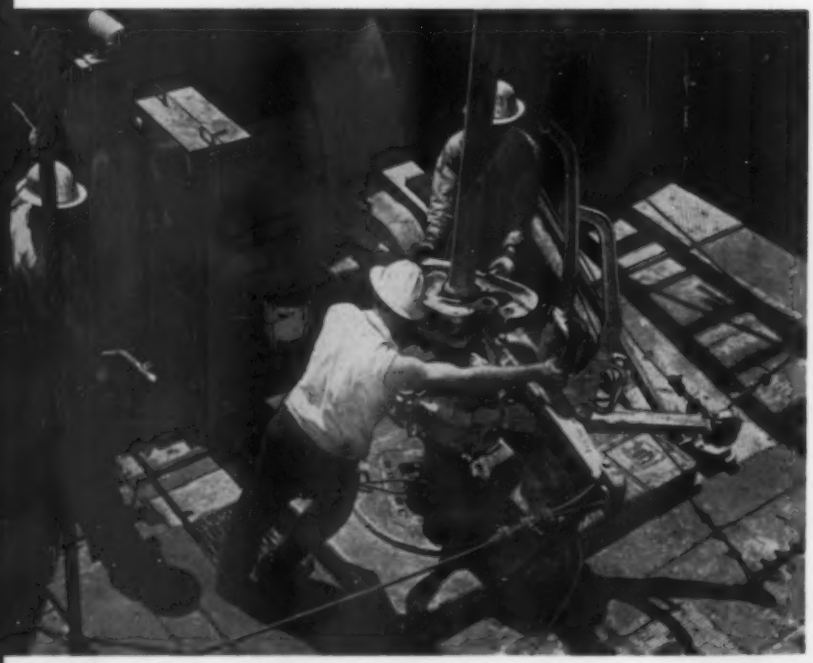
BAASH-ROSS JOY

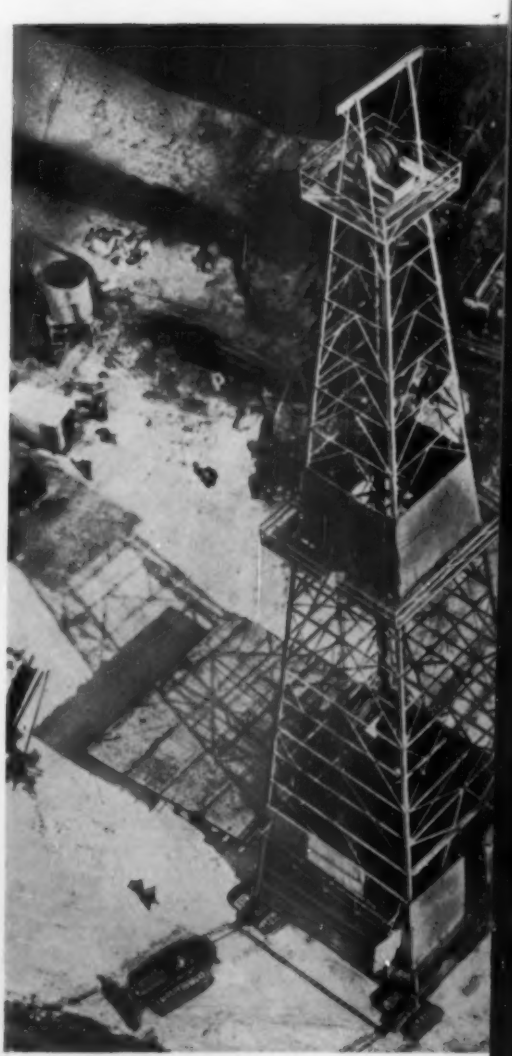
NEW FROM LIBERTY

AN OIL-WELL DRILLER'S INSURANCE PACKAGE



LIBERTY PROTECTS YOUR MEN. We help you set up your own on-the-rig first-aid program. Our engineers check working conditions, and when accidents do occur, Liberty's claimsmen assure speedy medical care. This kind of protection has helped make us the largest writer of workmen's compensation for the past 20 years.

LIBERTY PROTECTS YOUR FLEET. Guard against damage to your own trucks and company cars, and against crippling lawsuits for liability. Your fleet coverage, like all other parts of this across-the-board program, is designed to fit your problems.



LIBERTY PROTECTS YOUR COMPANY. Hazards on a drilling site are great. Awards for damage to surrounding property, livestock and crops can put a driller out of business. Liberty's Public Liability coverage is built right into our 4-way plan, assures good protection when you need it.

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THAT PROTECTS 4 WAYS

Now you can save money by placing all your coverages with this one company

When you insure your operation with Liberty, you're dealing with a company that knows your problems, gives you protection when and where you need it. Drawing on years of experience in controlling industrial and construction hazards, we've developed a 4-way protection plan that's tailor-made for oil-well drillers. We'd like a chance to talk with you, compare your present insurance with Liberty's coverage and, if you wish, make a formal proposal.

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. . . performance beyond the usual . . .

Design of high-speed precision machinery often calls for bearings which offer the utmost in load capacity, "hot hardness", dimensional stability. Each machine presents its own exacting requirements.

Fulfillment of unusual requirement combinations is a specialty at Rollway. Your selection of exactly the right precision radial cylindrical roller bearing is assured by:

- **A broad range of types and sizes, numbered in the thousands**
- **Retainers of standard bronze or "Rollube" ferrous alloy, in roller-riding, land-riding, or broached construction**
- **Crowned rollers**
- **Modification of any factor to meet your application**

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MAXIMUM

BEARINGS

To further implement your choice, the Rollway Catalog and Engineering Data Book contains the first listing, by any manufacturer, of the thrust capacities of cylindrical radial roller bearings.

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ROLLWAY
Maximum
ROLLER BEARINGS

S&J AIR BAFFLE

proved to reduce vapor loss up to 50%

Downward velocity of air jetting into a tank through the breather vent causes currents which induce rapid product evaporation. S & J Air Baffle is a device which deflects incoming air into stratified layers above heavier, gas-rich air. The result is materially reduced surface boiling, with vapor losses cut from 25 to 50%. Unique Air Baffle design permits simple installation through the vent nozzle on tanks in service. Call or write for complete details and prices.

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4927

BUTTRESS THREAD CASING

meets crucial needs at lower depths

Without a hitch, 4,416 feet of J&L Buttress Thread casing were set recently near the top end of a 14,428′ string at the Mitchell #1 well in the Carter-Knox field, Grady County, Okla.

The setting of 357 lengths of casing was accomplished in less than 24 hours.

High joint strength of Buttress Thread casing is attained by combined effect of completely engaged runout threads and the three-degree flank angle of the thread.

Easy stabbing, rapid spinning and fewer power strokes to pull the coupling up to power-tight position are provided by the unique thread design.

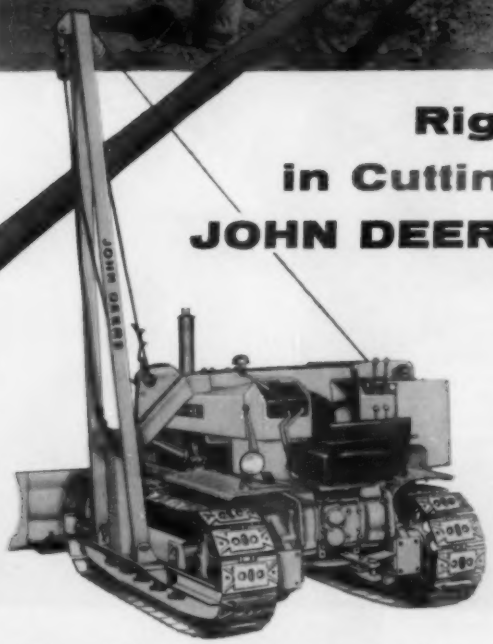
Get complete information on this new J&L casing for your most severe drilling operations. Write to the Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J&L STEEL

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

Right Up Your Alley in Cutting Pipe-Line Costs . . . JOHN DEERE Industrial Power Units



Ditching, backfilling, pipe-laying, site preparation, meter station construction and maintenance—there's a John Deere Industrial Unit equipped to handle each or all of these jobs efficiently and economically.

Are you paying a costly premium on many of your construction and maintenance projects simply because you are using bigger equipment than you need?

Every pound of machinery over and above the particular demands of a digging, loading, or hauling task is waste and takes its toll in more rapid equipment depreciation, higher fuel and maintenance costs, and lost time on the job.

On by far the majority of oil and gas distribution construction projects, John Deere Wheel and Crawler Industrial Units are right up your alley. Small enough to get around easily in close quarters, they have the heft to handle amazingly big work loads, and the stamina to stand up under the most grueling daily schedules. They have a big appetite for work, yet operate on a lean diet of fuel. In a few words, they have the speed, power responsiveness, and economy that make every minute count.

There's a John Deere Industrial dealer near you. Ask him to give you a demonstration.

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All the comforts of home

A little bit of home flies with you when you take a trip on one of today's modern airliners. The friendly comforts . . . the small but important needs . . . are graciously and thoughtfully provided. No wonder so many people are flying.

Last year, America's airliners carried more than 42,000,000 passengers a total of 25 *billion* miles. Providing the fuels and lubricants to make this possible has been a big job for the petroleum industry. Texaco is proud of its part in this task—for during the last 23 years more scheduled revenue airline miles in the United States have been flown with Texaco Aircraft Engine Oil than with all other brands combined.

TEXACO

PROGRESS AT YOUR SERVICE

THE TEXAS COMPANY

BS&B Research & Development Facilities... An Investment In Your Future And Ours!

Out of these BS&B facilities for product research and development ... and out of the minds of the men who labor here ... have come notable technological advancements in natural gas and crude oil production, processing, measurement and storage.

These facilities, staffed by highly experienced, full time development engineers, provide for full-scale testing of equipment under actual lease conditions. The laboratory has an oil, water and gas circuit which allows testing of low pressure equipment at oil flow rates up to 3,500 barrels per day, and a high pressure gas circuit, capable of flowing 10 million standard cubic feet of natural gas per day.

Examples of new equipment developed and tested here include BS&B's Lease Automation Systems, Liquid Metering Equipment and Ammonia Absorption Refrigeration Units. These contributions to a better future for the oil and gas industries were made possible by *you*, our customers, because a part of every dollar invested in the purchase of BS&B oilfield equipment goes into a continuation of this research and development program.

From it you will receive many future "dividends" in the form of new equipment developments, improved technology and additional savings through increased operating economy. Make it a habit *always* to call your BS&B man *first!*

"BS&B research shows the way"

BLACK, SIVALLS & BRYSON, INC.
Oilfield Equipment Division, Dept. 1-A8
P.O. Box 1714 Oklahoma City, Okla.

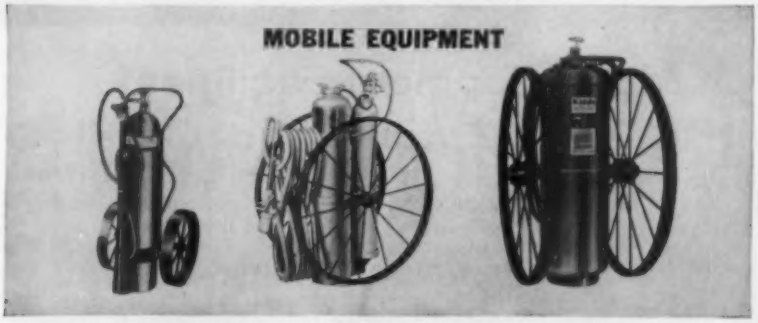
GET THE JUMP ON FIRE
with Kidde extinguishing equipment!

PORTABLE EXTINGUISHERS

Left to right: carbon dioxide trigger, carbon dioxide squeeze valve, 2½ gallon foam, 2½ gallon pressurized water, 20-pound pressurized dry chemical, 20-pound cartridge-operated dry chemical, 2½ gallon pump tank, one quart pressurized VL. Also 1 gallon pressurized VL and 1 and 1½ quart pump VL.

Kidde hand portables are designed to knock fires out *fast*, come in a variety of types and models. The Kidde line includes carbon dioxide extinguishers with fast-acting trigger release or squeeze-valve release in capacities of 2½ to 20 pounds. Kidde dry chemical extinguishers can be had in pressurized models of 5, 10, 20 and 30 pounds capacity, and in cartridge-operated models of 20 and 30 pounds. Kidde wet chemical extinguishers (foam, soda-acid) are available in 2½ gallon bronze or stainless steel models, including cartridge-operated and pressurized water or water-anti-freeze units. Kidde vaporizing liquid extinguishers come in pump capacities of 1 and 1½ quarts, pressurized in 1 and 1½ quarts and 1 gallon. Kidde pump tank extinguishers, in steel or copper shells, are available in 2½ and 5-gallon sizes.

MOBILE EQUIPMENT



Left to right: 100-lb. carbon dioxide, 150-lb. dry chemical, 40-gal. foam. Also 40-gal. soda-acid.

For major fire hazards, get a mobile unit. Wheeled carbon dioxide units are available in 50, 75, and 100-pound capacities, in one cylinder. Shut-off valve located at nozzle gives operator complete control. 150-pound dry chemical unit has straight stream for long range... fan pattern for wide coverage. Single-lever control for "on," "off," "fan," or "straight" discharge pattern. 50 feet of hose. 40-gallon wheeled foam unit delivers more than ten times its liquid content capacity in fire-smothering foam. Ideal protection against flammable liquid fires. All give expert results even with inexperienced operator.

SMOKE AND FIRE DETECTORS, CARBON DIOXIDE SYSTEMS

Kidde Industrial Smoke Detectors give you a fire warning where it counts—at the smoldering start of a fire—tell you fire's location, give you a visible and audible alarm.

Kidde Atmo fire detecting and warning systems afford wide-area protection, are ideally suited for cases where early detection of fire in valuable materials is essential. Working on the principle of rate-of-temperature-rise, Kidde Atmo systems give warning at the first hot breath of fire, can be used to shut off fans, close doors, etc.—all automatically.

Kidde carbon dioxide extinguishing systems are individually designed to fully protect even the most dangerous hazards, use pneumatic control heads to insure instant and complete carbon dioxide discharge. Directional valves afford protection to more than one hazard using the same bank of cylinders. All operating parts are self-enclosed for safety. Visual indicators show at a glance if system is "set" or "released." Thermostatically-operated systems, and package systems for 6000 cubic foot flammable liquid hazards are available.

Kidde (K Kidde)

Walter Kidde & Company, Inc.
854 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal — Toronto — Vancouver

They Say—

How to graduate with honor

Dear Sir:

I have just graduated from the Royal School of Mines . . . I would like to take this opportunity of telling you that I found your magazine extremely useful for getting up-to-the-minute information with which to startle and impress examiners!

I think I succeeded quite well in doing this, for I was awarded a first-class honors degree in oil technology—the first that the faculty has had for 3 or 4 years. Thank you for the part you played in this success.

Richard Barry
London.

Bad times for geophysics

Dear Sir:

The article on declining income for geophysical contractors in the July 14 issue of the Journal (p. 72) certainly rates our highest compliments.

As usual, the Journal did an excellent job of displaying the salient facts and in making a highly readable story out of a set of rather dull statistics on the contract geophysical industry.

My congratulations . . . for pulling all this material together into such a fine piece of reporting. I naturally cannot help but feel that it is very much to the advantage of the U. S. geophysical contractor to have his economic troubles made known, and I am gratified that the Journal, as well, felt that this story had sufficient news value to rate it such a prominent place in your July 14 issue.

John W. Wilson
Geophysical Service, Inc.
Dallas.

Gas cool-air market grows

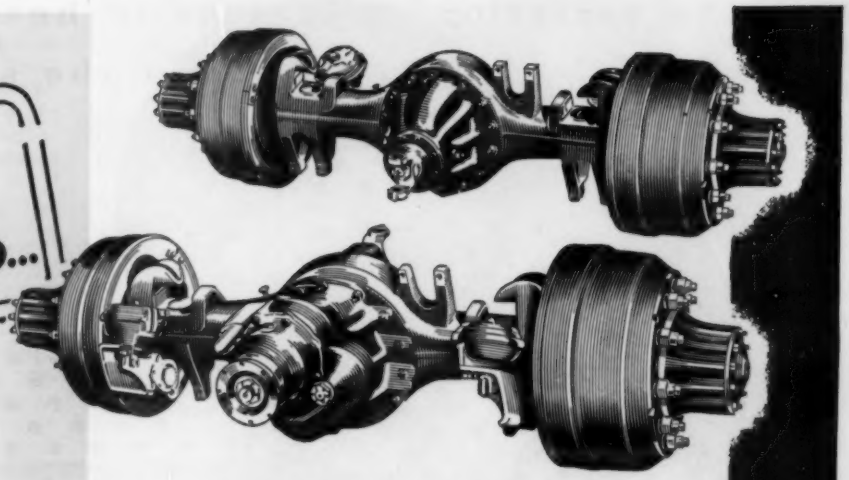
Dear Sir:

It has been brought to my attention that you are interested in the long range effect on the gas industry's economic position as a result of the growing sales effort behind gas air conditioning. . .

The gas industry developed one of the first central air conditioning systems for the residential market, but unfortunately the development of this project and the sales effort by gas utilities lagged for a number of years.

This situation has changed to a

PROVED AND PREFERRED...



For three years..

Timken-Detroit® Lightweight Driving Tandems—First Choice With Big Over-the-Highway Operators!

These superior features make the difference:

Lighter than any comparable tandem on the market . . . but a real heavyweight when it comes to service. Besides increased payloads you get long, trouble-free service and lower operating costs. Time-proved, Timken-Detroit Lightweight tandem features include:

Driver Controlled Inter-Axle Differential. Torque is divided equally between axles, yet wheels of one axle can turn faster or slower than wheels of other axle. This means both axles are always doing equal amounts of work. Driving parts and tires last longer.

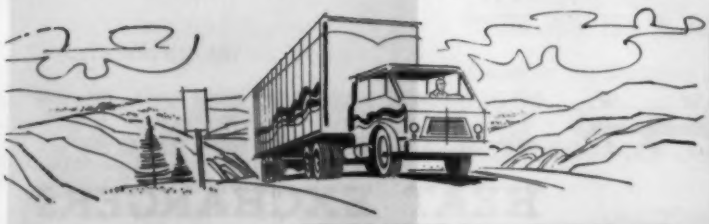
"In-Line" Propeller Shaft Drive. With straight-through drive, bearing and gear life is greatly increased because universal joint working angles are materially reduced.

Torsion Flow Axle Shafts. More splines, plus greater root and body diameter, add extra strength.

Hot Forged Rectangular-Shaped Axle Housings. Rectangular shape, combined with full strength corner sections, provides the greatest strength with minimum weight and size. Welded on bowl cover prevents leakage.

Hypoid Gears. Larger pinions and greater tooth contact give 30% more torque capacity, top efficiency and long life . . . plus lower maintenance costs.

Unmatched Parts Interchangeability. Most of the wearing parts—gears, bearings, shafts, differentials, brakes—are interchangeable with parts from Timken-Detroit standard single axles. Parts are readily available and less expensive.



WORLD'S LARGEST MANUFACTURER OF AXLES FOR TRUCKS, BUSES AND TRAILERS

TIMKEN Detroit AXLES

ROCKWELL-STANDARD CORPORATION

TRANSMISSION AND AXLE DIVISION

DETROIT 32, MICHIGAN

Accepted DA Standard

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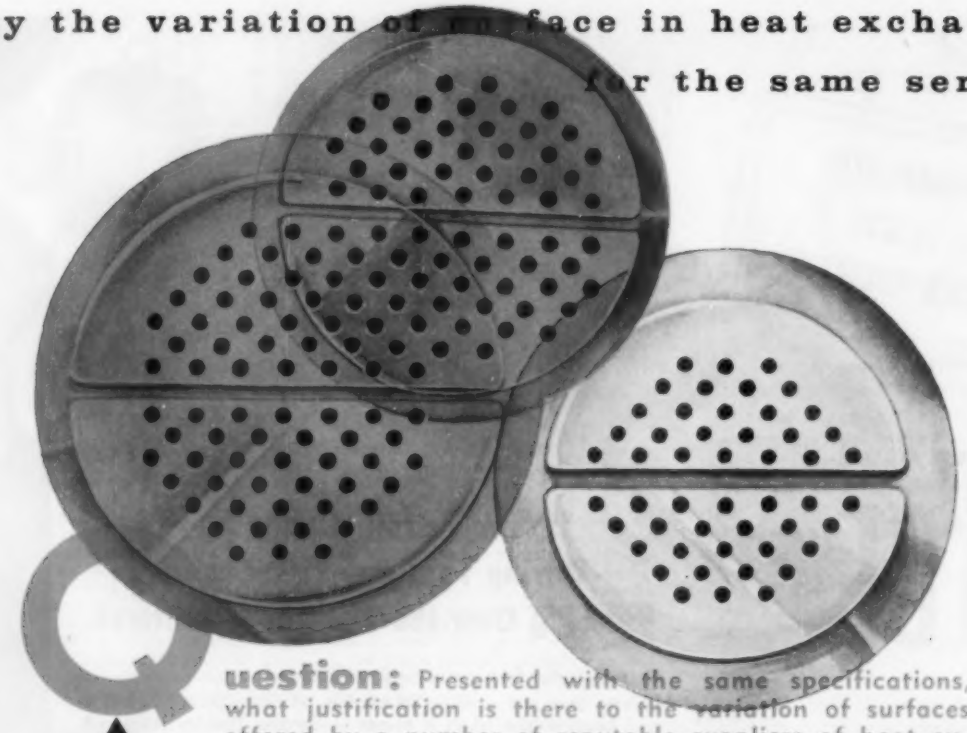
Products of **ROCKWELL-STANDARD** Corporation

Why the variation of surface in heat exchangers for the same service?



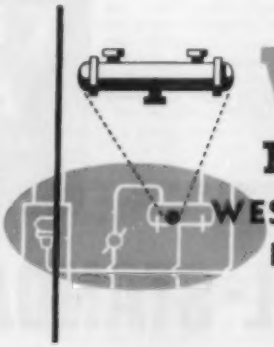
Question: Presented with the same specifications, what justification is there to the variation of surfaces offered by a number of reputable suppliers of heat exchanger equipment, for a given service?

Answer: **Since heat transfer calculation to date is not an exact science, the data on which design curves are based may vary over a wide range, and EXPERIENCE is often the deciding factor, SO THAT . . . .**

. . . . Western's years of experience in heat exchanger design, with both the small independent refiners as well as with the giants of the industry, are a great asset in helping you select the equipment you need for your *specific problem.*

Personal attention to detail and knowledge of customer preferences are integral in each Western-customer relationship. Utilizing the most modern methods and machinery in rating and fabrication results in achieving the highest heat transfer efficiency at realistic prices.

Western specifies the surface to fit your specific service — no more and no less.



WESTERN

HEAT EXCHANGERS

WESTERN SUPPLY COMPANY

P.O. Box 1888 – Tulsa, Oklahoma

remarkable degree. There have been marked improvements in the gas air conditioning systems available, prices have been reduced, manufacturer interest has been stimulated, and the gas utility industry has begun to seriously and aggressively promote the sale of this equipment.

One of the inevitable and important by-products of the gas air conditioning sales effort will be to improve the load factor not only of the nation's pipeline systems but of the gas producer as well. . .

It might be noted that in 1955 less than a dozen gas air conditioning units were sold by Southern Union Gas Co. In 1956—after we had decided to go after this market—approximately 65 residential and commercial installations were made. In 1957, this figure climbed above 300. This year our goal is a minimum of 500 sales of residential and small commercial gas air conditioning units. At the same time we have been working with architects, engineers, and building owners in order to have gas air conditioning specified for office buildings and other large installations.

In January of 1956 the total tonnage of gas air conditioning on Southern Union's lines was approximately 2,700 tons. This had increased to 11,150 tons by January 1, 1958, and our goal is a minimum of 25,000 tons by the end of this year. . .

By 1966 we expect to have 21,000 residential and commercial installations on our system, and by 1976, we hope this figure will exceed 54,000. In addition, we have every expectation that the installation of large scale air conditioning systems will accelerate at an equally rapid rate. . .

It is our belief that the air conditioning load may easily mean the difference between whether our company shows a profit or loss during the summer months. . .

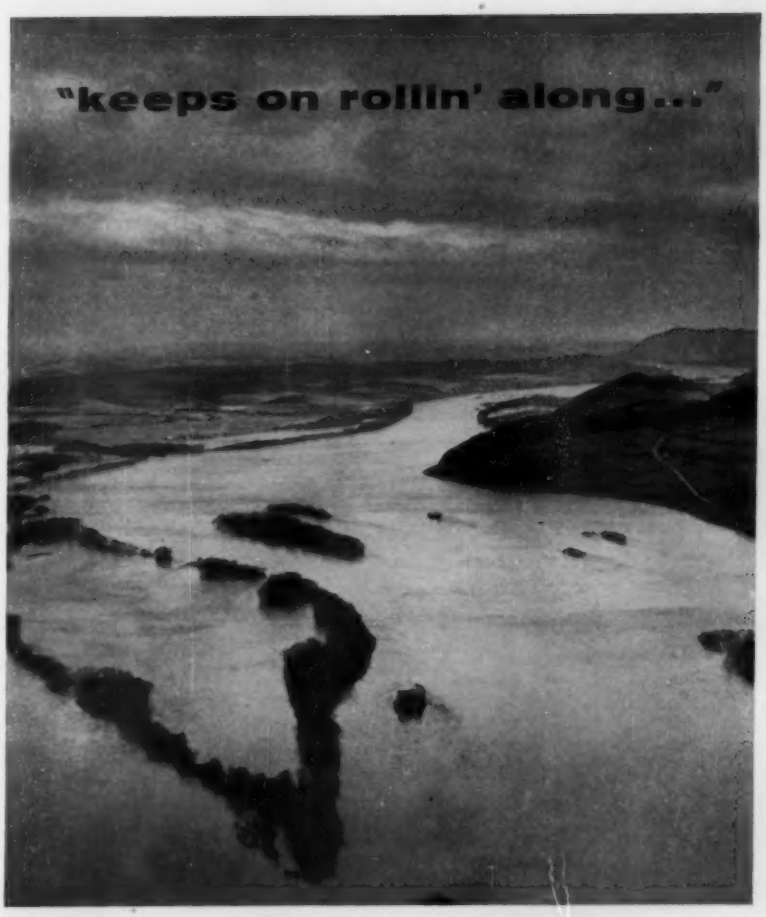
C. H. Zachry
President
Southern Union Gas Co.
Dallas

Geochemistry series good

Dear Sir:

Referring to the series of articles by Bartholomew Nagy on "Fundamentals of Geochemistry," which appears in The Oil and Gas Journal (Part 1, June 30; Part 2, July 14; Part 3, July 28; Part 4, August 11; Part 5, August 25), I ask you to put my name on your list for eight reprints.

All of us geologists of the Tulsa division office highly commend The Oil and Gas Journal for printing



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proven performance in industry

Since its discovery in 1541, the Mississippi River has kept right on rollin' along, year after year, playing its important role in our national economy.

Deming Pumps, like this mighty river, have set the pace year after year . . . have proven their ability, through performance, to handle a wide variety of liquids for diversified industrial applications.

There is a Deming Pump to meet any industrial pumping requirement. The complete Deming line provides a wide selection of more than 10,000 types, sizes and capacities.

Depend on Deming . . . write for complete information.

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Please send me a copy of your Industrial Pump Bulletin I-57-E describing pumps for every industry.

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the series, "Fundamentals of Geochemistry."

Charles Ryniker
Gulf Oil Corp.
Production Division
Tulsa

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

AUGUST

11-14 Society of Automotive Engineers, National West Coast meeting, The Ambassador, Los Angeles.

18-19 North Dakota Oil and Gas Association, annual meeting, Grand Pacific Hotel, Bismarck, N. D.

18-20 American Institute of Chemical Engineers, American Society of Mechanical Engineers, second annual heat-transfer conference, Edgewater Beach Hotel, Chicago.

19-22 American Institute of Electrical Engineers, general meeting, Sacramento.

20-23 Alberta Society of Petroleum Geologists, eighth annual field conference, Nordegg, Alta.

25-27 Appalachian Gas Measurement Short Course, University of West Virginia, Morgantown, W. Va.

SEPTEMBER

7-12 American Chemical Society, fall meeting, Chicago.

10-12 National Petroleum Association, fifty-sixth annual meeting, Traymore Hotel, Atlantic City, N. J.

10-13 Intermountain Association of Petroleum Geologists, ninth annual field conference, Paradox basin.

14-19 Instrument Society of America, thirteenth annual instrument-automation conference and exhibit, Convention Hall, Philadelphia.

15-16 Independent Natural Gas Association of America, annual membership meeting, Roosevelt Hotel, New Orleans.

15-17 American Institute of Electrical Engineers, fifth electrical conference of the petroleum industry, Baker Hotel, Dallas.

18 Natural Gasoline Association of America, Rocky Mountain regional meeting, Gladstone Hotel, Casper, Wyo.

18-20 Rocky Mountain Association of Geologists, field trip, Maroon basin, registration, Glenwood Springs, Colo.

21-24 American Society of Mechanical Engineers, petroleum division, mechanical engineering conference, Cosmopolitan Hotel, Denver.

24-25 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

25-26 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

25-27 Illinois State Geological Survey, biennial petroleum engineering conference, University of Illinois, Urbana.

29-Oct. 3 Society of Automotive Engineers, national aeronautic meeting, aeronautic production forum, and aircraft engineering display, The Ambassador, Los Angeles.

OCTOBER

1-2 Western Petroleum Refiners Association, third annual stream-pollution and waste-disposal conference, Lassen Hotel, Wichita.

1-3 American Association of Oilwell Drilling Contractors, eighteenth annual meeting, Adolphus and Baker Hotels, Dallas.

3 American Institute of Chemical Engineers, South Texas section, thirteenth annual technical meeting, Moody Center, Galveston, Tex.

5-8 Society of Petroleum Engineers of AIME, fall meeting, Houston.

5-8 National Association of Corrosion Engineers, northeast region, Somerset Hotel, Boston.

7-8 Texas Mid-Continent Oil and Gas Association, annual meeting, Statler-Hilton Hotel, Dallas.

9-10 California Natural Gasoline Association, thirty-third annual fall meeting, Huntington-Sheraton Hotel, Pasadena, Calif.

10-12 Tri-State Oil Show, Roberts Municipal Stadium, Evansville, Ind.

12-18 OIL PROGRESS WEEK.

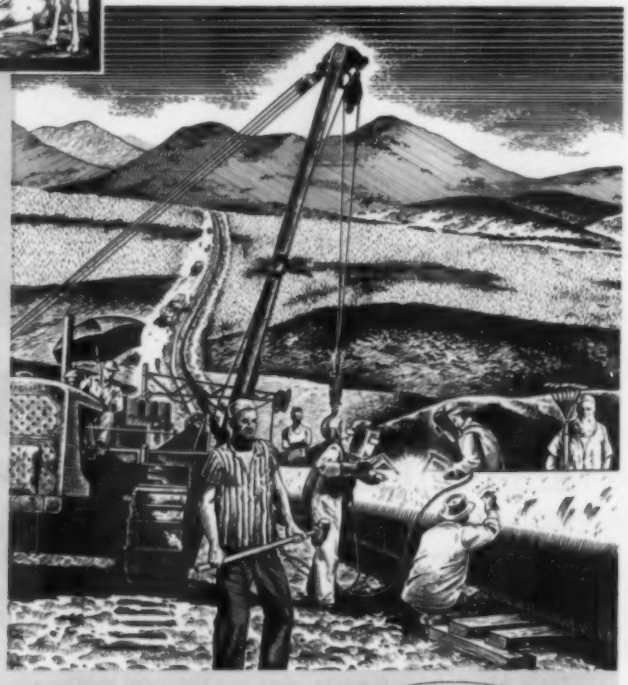
13-15 American Gas Association, annual convention, Atlantic City, N. J.

13-15 American Society of Mechanical Engineers, American Society of Lubricating Engineers, conference on lubrication, Statler Hotel, Los Angeles.

13-16 Society of Exploration Geophysicists, annual meeting, Hotel Gunter, San Antonio, Tex.

13-17 American Society of Civil Engineers,

Pipelines are in the News



Watch . . . WILLIAMS BROTHERS

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Washington — Pittsburgh — Louisville
Minneapolis — New Orleans — Caracas
Bogota — La Paz — Edmonton
Calgary — London — Ankara — Tehran

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CONSTRUCTORS
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CABLE ADDRESS: WILLBROS

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SAFE INSTALLATION

When you fabricate your large volume meter sets with Rockwell products, you can be sure of this—your measurement will be accurate, your regulation constant, your valves will turn easily and shut tight.

And there's extra security built right into all Rockwell products—to resist shock, to prevent leaks, to discourage tampering.

Next time, why don't you go all the way with Rockwell? Enjoy the peace of mind that comes from using only the finest, safest equipment.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Charlotte Chicago Dallas Denver Houston Los Angeles Midland, Tex. New Orleans New York N. Kansas City Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

ROCKWELL METERS, REGULATORS
ROCKWELL-Nordstrom VALVES

WHEN you think of "service" in relation to equipment, two meanings for the word come to mind. The first relates to how well the equipment performs. The second, how well the supplier handles the details of getting equipment, parts or information into your hands.

Rockwell has built its business by

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annual convention, Hotel Statler, New York.

15-16 South Dakota Independent Oil Men's Association, convention, Sheraton-Johnson Hotel, Rapid City.

15-16 University of Kansas, Southwest Kansas Center, sixth annual Gas Measurements Institute, Liberal, Kans.

15-17 National Association of Corrosion Engineers, north central region, Cincinnati.

16-17 Society of Petroleum Engineers of AIME, Southern California petroleum section, Biltmore Hotel, Los Angeles.

16-18 New Mexico Geological Society, Arizona Geological Society, ninth annual field conference, Black Mesa basin, registration Gallup, N. M., Oct. 15.

16-18 Permian Basin Oil Show, Odessa.

19-21 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Adolphus, Dallas.

20-24 National Association of Corrosion Engineers, south central region, Roosevelt Hotel, New Orleans.

20-24 National Safety Council, forty-sixth National Safety Congress, Conrad Hilton Hotel, Chicago.

22-23 National Association of Corrosion Engineers, western region, corrosion control course, U. S. Grant Hotel, San Diego, Calif.

22-24 Society of Automotive Engineers, national diesel engine meeting, Lord Baltimore Hotel, Baltimore.

22-25 Southwestern Federation of Geological Societies, regional meeting, Mineral Wells, Tex.

23-24 Rocky Mountain Oil and Gas Association, annual fall meeting, Town House Motel, Omaha.

23-24 Western Petroleum Refiners Association, refining technology and industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

26-31 American Institute of Electrical Engineers, general meeting, Pittsburgh.

27-28 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

NOVEMBER

5-6 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

6-7 American Association of Petroleum Geologists, Pacific section annual meeting, Los Angeles.

6-7 Louisiana Polytechnic Institute, School of Engineering, seventh annual instrumentation conference, Ruston, La.

10 Transportation Club of the Petroleum Industry, annual meeting, Bismarck Hotel, Chicago.

10-13 American Petroleum Institute, thirty-eighth annual meeting, Conrad Hilton, Palmer House, and Congress hotels, Chicago.

18-20 Ninth National Conference on Standards, Hotel Roosevelt, New York.

20-21 American Society of Civil Engineers, structural division and Kansas City section, conference on electronic computation, Kansas City.

21 Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

30-Dec. 5 American Society of Mechanical Engineers, annual meeting, Statler and Sheraton-McAlpin hotels, New York.

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JOURNALLY SPEAKING

The Troubles of Job

IF THIS PICTURE looks a little like a Babylonian clay tablet, the resemblance is entirely intentional.

It's the cover of "Petroleum Panorama," a special issue the Journal will publish next year to commemorate the 100th anniversary of the oil industry. And since oil was used by the ancient Babylonians, it is appropriate that our cover convey a feeling of oil's antiquity.

But our book isn't going to dwell on references to petroleum found in ancient literature, fascinating as that subject is. So much has happened in the 100 years since oil became an industry that we can't crowd half of it into the number of pages we have allotted ourselves.

We've been boiling down and condensing, but even so we can only cover the high spots. Hence the name Panorama, which we mean to imply a wide-lens view showing the general relationship of things without great detail on any one feature.

Our capsule history of oil's century of progress is going to be very interesting and also very useful to everybody in, or interested in, the oil business, but there will be plenty of room left for other books about the oil industry. Doubtless quite a few such will be published in 1959.

For instance, quite a book could be written about apparent references to oil and gas in the Bible and other ancient writings. The Babylonians, we know, used natural asphalt to waterproof their clay bricks, irrigation canals, and reed boats. And the pitch with which Noah calked his ark may have been the same material.

To anyone inclined toward such research we pass on a tidbit of Biblical interpretation culled from a magazine article written in 1883:

"Talking one day about the first discovery of oil with a wildcatter on one of the narrow-gage railway lines that run over the mountains and through the forests to reach the wells of Warren and McKean counties, the man said:

" 'Why, the oil business is no new thing. It's as old as the Scriptures. Job was an oil man. He struck the rock and it poured forth rivers of oil. He got rich in the oil business.'

" 'Yes,' chimed in a stranger on the other side of the car, 'and that's the way he got his boils. I know men who can't be about oil wells without getting boils. They breath in the carbon and it gets into their blood.'

"The wildcatter agreed to this theory and added he had no doubt Job's wells took fire, burned up his children, and reduced him to poverty."

Now medical science may not agree with this theory of the cause of boils and Biblical scholars may not agree that Job was in the oil business, but today's oil man probably will agree that being in the oil business brings all the troubles of Job.

We'll let others decide whether or not Job's classic troubles were caused by oil. Our Panorama will chronicle some of the troubles—and the triumphs—of oil.

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—Henry D. Ralph

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Conservation is not a static concept

AT long last the Oklahoma Corporation Commission has issued a proposed revision of its entire set of oil and gas conservation regulations. At first look it appears to be a thoroughgoing and workmanlike job.

The forthcoming public hearings may indicate that some of the proposed revisions go too far, others not far enough. But the commission is to be commended for bringing the issue to a head.

The Journal has long been critical of Oklahoma for having the best laws and the poorest compliance of any oil-producing state. Once the "mother of conservation," the state has lapsed far behind the progress that has been made elsewhere.

THE PROPOSED REVISION could eliminate many of the ills that have soured responsible operators on Oklahoma. They are clearer and more specific, easier to interpret, easier to comply with, easier to enforce.

They promise to stop many of the abuses which have grown up through loose interpretation and lax enforcement, and thereby promote equity and protect conscientious producers.

Protection of fresh-water sources—one of the most venerable and fundamental objectives of conservation—may at last be achieved under the new rules for drilling, casing, and plugging.

More complete reporting by operators is called for. This would give the commission the statistical basis for a control program—for lack of which it has been operating largely in the dark.

Important changes are proposed in the allowables system. They are designed to stimulate exploration and development of the state's deeper reserves and give some recognition to high-cost production. New rules on producibility tests, underages and overages, and other technical features should curb abuses and bring the state's actual production more in line with the commission's estimate of market demand.

On the controversial subject of regulating the output of unitized, waterflood, and pressure-maintenance projects, the commission is taking at least the necessary first step. It proposes to define, classify, and get reports on them, thus laying the basis for intelligent regulation later if desirable.

THE BEST PART ABOUT THIS is the recognition that conservation control is not a static thing. There are constant changes in knowledge of reservoir behavior, production technology, legal concepts, economic conditions, and market demand.

To keep abreast of progress, state regulatory systems should be in a condition of almost continuous revision and modernization. Perhaps this year Oklahoma can again point the way for other states to improve their conservation practices.

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Steel-Price Rise Starts Costing Oil

• Initial effect of increases is slight because companies are still living off their inventories. Boosts will add $48 million annually to steel bill when depleted stocks force operators back into market for quantity buying.

THE OIL INDUSTRY is tasting the steel-price increases in small doses now, but the tab will mount up to at least $48 million in extra costs in the next year.

The expected price boost went into effect last week. But oil companies aren't going to the market any more than they have to. They're still living off their inventories, buying only for current needs.

However, buying is due to start picking up gradually the last of the third quarter and will increase in the fourth quarter as stockpiles are liquidated or depleted below working levels. That's when the industry will start feeling the higher steel costs more.

The increases . . . Initial price boosts on oil-country items apply only to tubular goods and line pipe.

Tubular goods and line pipe last year accounted for 82% of the 6½ million tons of steel goods used by the oil and gas industry.

The increases, averaging about 3⅓%, range from $6 to $10 a ton. They include:

. . . **Drill pipe,** $10 a ton.
. . . **Seamless casing,** $7 a ton.
. . . **Tubing,** $8 a ton.
. . . **Line pipe,** $6 a ton.

Suppliers told The Oil and Gas Journal proportionate increases are almost certain on other oil country goods—sucker rods, pumps, pumping units, tanks, rock bits.

One stated: "It may be a week, 10 days, a month before others go up. Tanks and sucker rods will be affected quickly. Some of the others may be absorbed."

The higher prices on tubular goods and line pipe alone will cost the oil industry about $40 millions in the next year. That's based on an expected consumption of 6 million tons of steel products.

If the increase is spread to other oil-country goods, it will add another $8 million to the tab.

The $48-million figure is the minimum. The extra costs will also affect finished products used by oil men, such as trucks, engines, etc.

Buying . . . The pickup in buying the latter part of this year will be gradual. No one predicts a boom.

There were slight spurts in sales the latter part of June, and again the last week in July. Those were attributed to "hedge" buying—mostly by independents—to beat the expected price increases. But suppliers say sales still are off from 25% to 50% from last year, even though some improvement is noted.

Both suppliers and oil-company purchasing agents told Journal editors that while oil-company inventories are down, they are generally still above working levels because drilling still is not yet back to normal.

Of the companies surveyed, predictions ranged from "several months" to "next year" before inventories reach the point where it will be necessary to start ordering in quantity again.

Most companies have been in the market for just spot requirements, buying hand-to-mouth. None are buying ahead.

New trend . . . The recession and plentiful steel supply brought some changes in operation by oil companies which probably will be continued.

None of the companies plan to build back their inventories to the pre-slump era as long as pipe is available and delivery is reasonable.

A purchasing agent for a Mid-Continent company said: "We don't intend to buy ahead as long as the mills have in-transit stocks available."

The companies prefer to let the supply houses and mills carry the costs of warehousing supplies.

A company in Texas said it plans to reduce its tubular goods inventory right down to scratch and buy as it needs, sometimes as little as a week or less before it needs to run the pipe in a well.

Several reported inventories would be kept only at a level for protection against various emergencies, such as strikes, lockouts, or military emergencies.

Another reported, "As long as we can get delivery within a month, we don't want to carry it ourselves."

Other economy measures still being carried out include:

. . . **Trading of steel** goods among companies to keep from going to the market.

. . . **Reclaiming and using** casing and other equipment from old wells whenever possible.

. . . **Eliminating the cost** of moving pipe great distances from the stockpiles. Companies get around this by trading, or buying pipe from companies in the area where it is needed.

A gamble . . . In keeping inventories low, companies are taking a chance they all won't have to go to the market for heavy buying at the same time.

That would change it back to a sellers' market from a buyers' market. Ever since World War II there have been periods when demand was greater than the supply.

As one veteran purchasing agent put it: "I'm not used to a buyers' market. I keep thinking that any day now the seller will be back in the driver's seat.

"All it would take would be for it to get around that a couple of the big boys were buying up all the steel. Then the little ones would jump in and we would be off again.

"We're hoping there won't be a scramble. But if there is, we would have to get into it."

Most companies are gambling it won't come.

Nothing new . . . This last steel price increase is the sixth since 1955, and the twelfth since War World II, bringing the basic price of steel to about $150 a ton.

The boost has been expected since steel workers were given wage increases July 1 totaling about 20 cents an hour. Steel companies and manufacturers explained they were not in a position to absorb the higher wage costs and had to pass them on.

The steel companies held the line on price increases for a month until Armco Steel Corp. broke the ice.

It has been a rolling adjustment of prices, unlike the across-the-board increases of recent years. The increases first applied to strip and sheet steels, and then spread to a number of products, including tubular goods.

The price hikes brought rumblings in Washington. The justice department told congress it is taking a look at the increases with a view toward any possible antitrust violations.

Antitrust Chief Victor R. Hansen of the Justice Department told a Senate subcommittee he is "giving very serious consideration as to whether a grand jury should be empaneled" to look into the steel price increases.

Federal Trade Commission Chairman John W. Gwynne told the same committee that past investigations by FTC found no price-fixing in the steel industry.

The boosts also brought some sentiment for price increases in crude oil.

Eugene M. Locke, Dallas, president of the Texas Independent Producers and Royalty Owners Association, said "Certainly it is only fair to expect increases adequate to offset the effects of any new increase in the price of steel.

"This time the American oil independent producer is in no position to absorb another increase in the cost of his steel goods, and it is unfair that he should be asked to do so."

Locke pointed out oil production had been held at near record low levels while domestic operating costs are at an all-time high. "In the past we have tried to absorb steel price hikes with the result that when crude prices are raised enough to compensate for accumulated cost increases, the public fails to see a direct relationship," Locke said.

"We have no course but to ask the crude-oil purchasing companies to recognize the importance of equitable crude prices to a healthy U. S. oil producing industry."

Oklahoma-Texas Gas May

- **New deal involving El Paso, Colorado Interstate, and Pacific Northwest will snap up gas committed to the dead Beatrice project and move it to the West Coast.**

- **Additional supplies from Canada and a new 34-in. line also are included in the latest proposal by El Paso.**

FREE-WHEELING Paul Kayser, president of burgeoning El Paso Natural Gas Co. and gas negotiator par excellence, has pulled off another big one.

Kayser last week unveiled a three-company deal with Pacific Northwest Pipeline Corp., an El Paso subsidiary, and Colorado Interstate Gas Co. which would enable El Paso to dispatch up to 550,000,000 cu. ft. daily more gas to its ravenous southern California market.

The new plan is a modification and expansion of the deal announced last summer. El Paso was to buy 200,000,000 cu. ft. daily from Pacific Northwest for the California market and move it through a 500-mile, 30-in. line from the Pacific Northwest system at Twin Falls, Idaho, to the California border near Las Vegas.

Kayser told the Journal last week that under the new deal El Paso will:

. . . Build a 34-in. line from a point a few miles south of Provo, Utah, 400 miles southwest to the California border in the Las Vegas area.

It will take gas at the Provo end from another 34-in. line which Colorado Interstate will lay from a connection with Pacific Northwest near Rock Springs, Wyo. The Colorado Interstate line will total 148 miles. The new construction will replace the line formerly planned from Twin Falls to Las Vegas.

. . . Buy 200,000 M.c.f. from Pacific Northwest.

. . . Buy another 200,000 M.c.f. from Colorado Interstate.

. . . Buy 150,000 M.c.f. of additional gas from the Savanna Creek area of Alberta on completion of a line from that producing area to the Pacific Northwest system at Spokane. This sale must be approved by Alberta authorities. The Canadian portion of this line will be laid by Westcoast Transmission Co., Ltd., and the 100-mile stretch from the international border at Kingsgate, B. C., to Spokane by Pacific Northwest.

All the gas included in the purchases would move through the new 34-in. line, which is expected to be in operation by January 1, 1960.

Kayser said it has not been decided how much compression will be built into the line, how many stations there will be, or where the stations will be located.

With maximum compressor horsepower, it could carry 700,000,000 cu. ft. daily, he said. Throughput is to be increased in stages to the maximum January 1, 1964. The projects are expected to be placed before the Federal Power Commission within 60 days.

The gas supply . . . Gas for the new line will be coming from Canada, the Rockies, and the Panhandle-Hugoton area of Texas and Oklahoma.

Here's how the supply will be assembled:

Pacific Northwest is selling Colorado Interstate 100,000,000 cu. ft. daily. It would have sold CIG 100,000,000 more as part of the supply for the Beatrice project, which has been hung up before FPC for more than a year.

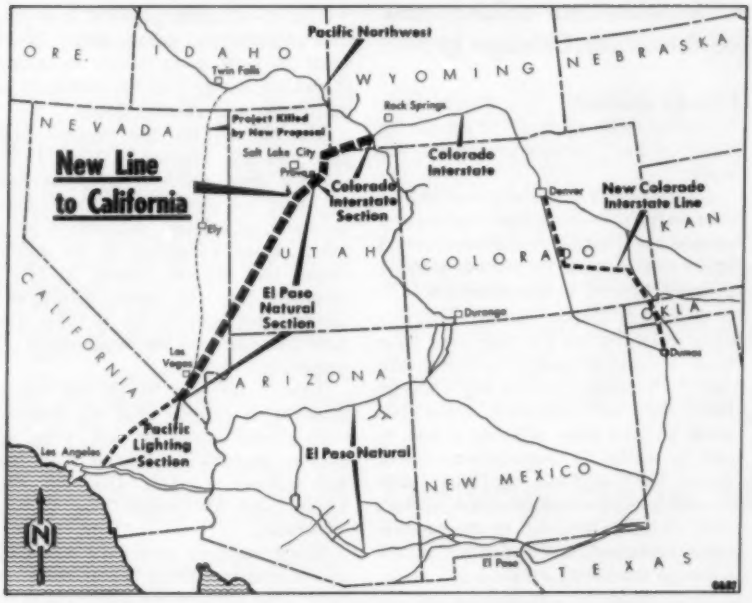
The Beatrice project, a $182-million venture of Colorado Interstate and Natural Gas Pipeline Co. of America, would have delivered 485,000,000 cu. ft. daily to the Chicago area. But because of the delay caused by rate troubles and resulting financing problems arising from the Memphis decision, requiring prior customer approval of new rates, the companies agreed last week to cancel Beatrice.

The supply previously committed to that project has now been thrown to the CIG-El Paso California line.

Under the new scheme, CIG, Pacific's largest customer, will no longer buy from Pacific. The 200,000,000 cu. ft. committed to CIG will be diverted to El Paso. Part of this gas is of Canadian origin from the Peace River area, part from Wyoming. CIG has also signed to sell 200,000,000 cu. ft. of its own gas to El Paso from its general supply in the Rockies and Panhandle-Hugoton.

The remaining 150,000,000 cu. ft.,

Go to California Market



as already set out, would come from the Savanna Creek area in southern Alberta, pending approval of Canadian authorities.

CIG has filed an application with FPC for permission to make a temporary sale to El Paso of 125,000,000 cu. ft. daily in the Texas Panhandle field. El Paso would pay 22 cents a M.c.f. for this supply, which would continue until the new facilities are available.

Colorado Interstate plans . . . CIG President W. E. Mueller announced that a subsidiary company would probably be organized to build new facilities to transport gas from Texas to Utah.

Construction plans were not detailed, but they were understood to include:

. . . 109 miles of 26-in. starting at CIG's Four-Way station in the Texas Panhandle.

. . . 135 miles of 34-in. from Morton Junction to Pueblo, Colo.

. . . 100 miles of 30-in. from Pueblo to Denver.

Under the proposed supply arrangement, Pacific Northwest gas will no longer be needed for Denver. So the 380-mile, 22-in. Rock Springs-Denver line, completed in January 1957, will be reversed. This will permit Texas and Oklahoma gas to flow all the way to California.

CIG will be able to retire most of its original 22-in. Dresser-coupled line from the Panhandle field to Denver, completed in June 1928. Service to Clayton, N. M., and Trinidad, Colo., will continue through parts of the old line.

The significance . . . With the Pacific Northwest line pumping in both directions toward Rock Springs, it will become probably the world's only long-distance gas trunk from which gas is taken at both ends and in the middle.

Canadian and Rocky Mountain gas supplies the northern section, and San Juan basin and other Rockies gas the southern section.

Under this method of operation the line will have realized close to maximum possible efficiency and utilization of facilities, Kayser said. Completion of the planned program, he said, will strengthen the gas-transmission and supply setup throughout the entire intermountain region. It's the type of deal envisioned in the El Paso-Pacific merger which is being contested by the Justice Department.

It may have other results, too. One would be to relieve pressure which the FPC has been applying as El Paso has continued large-scale expansion of deliveries to California. The commission has warned the company to bolster its reserves under contract and has withheld approval of parts of its program because of questionable reserves. El Paso's own figures show reserves to be more than adequate.

El Paso is obviously making every effort to prove its ability to serve the rapidly expanding California market, assuring customers and the FPC that competing lines are not needed.

One competitive line already before FPC is Transwestern Pipeline Co., a $193,000,000, 1,305-mile system from the Texas Panhandle and Southwest Texas.

Backers of this 24 and 30-in. line propose to deliver 350,000,000 cu. ft. daily at the California border to affiliates of Pacific Lighting Gas Supply Co. for the Los Angeles area, starting next fall. Deliveries would be expanded to 640,000,000 cu. ft. daily (OGJ, April 21, p. 100).

Another project in the mill is being pushed by Gulf Pacific Pipeline Co., which is trying to firm up plans for a line from South Texas to California. It was first reported Gulf Pacific was negotiating for Louisiana gas. It's understood that Tennessee Gas Transmission Co. is the principal backer.

Other effects . . . The El Paso-CIG deal was a natural for both companies.

While El Paso was badly in need of gas, CIG had gas coming out its ears. Suppliers committed to the delayed Beatrice project were growing impatient. The uncertainty was hurting both CIG and Natural Gas Pipe, which said it was interfering with orderly development of its markets.

The new California project gives CIG—and Oklahoma gas producers—access to a new and growing market. It also provides the company with an expansion about equal to the $87-million Beatrice project which is now dead.

Natural Gas Pipe already has an expansion under way this summer to increase Chicago deliveries up to 185,000 M.c.f. daily. And a substitute for Beatrice can be expected for next year.

Alabama Land Gets One Bid

TIDELANDS Development Corp. was the lone bidder for extension of the existing oil and gas lease on 144,648 acres underlying the Gulf of Mexico and the Mississippi Sound off the coast of Alabama.

The Alabama Department of Conservation offered a 5-year lease on the acreage, effective with expiration of the present lease in 1962.

Tidelands Development Corp., the present leaseholder, offered annual rental of 50 cents per acre plus a bonus of $3,200. Conservation Director W. H. Drinkard took the offer under advisement.

OCAW Rebels Defeated

. . . in Detroit court decision. International officers now seek Aurora settlement. Strike threat for Chicago grows.

THE OIL, Chemical and Atomic Workers International Union now is concentrating on settling a 12-week unauthorized strike at the Trenton, Mich., plant of Aurora Gasoline Co. after winning control of its rebel local.

Victory of the international office over the local came in the Wayne County Circuit Court of Judge Victor Torganski. The Detroit judge made permanent a temporary injunction he had issued earlier against four expelled leaders of the Trenton local.

The judge restrained Floyd Rue, George Vitale, William Kelledes, and B. F. Henson from interfering with conduct of the affairs of local 11-456, from interfering with Clyde S. Shamblen's administration of the local, and from conducting any business on behalf of the local.

Torganski turned the local's assets and records over to Shamblen, OCAW District 7 director at Chicago. He was sent to Trenton after the four local leaders were ousted for calling the wildcat strike of 327 union members against Aurora. The local later voted to refuse to abide by the administratorship.

Torganski also directed that the four expelled leaders be reinstated to union membership, but not to their former offices. He held that OCAW President O. A. Knight's expulsion of the four was not procedurely proper. Knight had charged the quartet with blocking efforts to settle the strike and with coercion and intimidation.

Rue had been president of local 11-456, Vitale secretary-treasurer, Kelledes vice president, and Henson local representative of the international union.

A court-supervised election will be held soon to select local delegates to the OCAW national convention opening September 22 in Long Beach, Calif. The entire Aurora subject will be reviewed on the convention floor.

OCAW said the purpose of establishing the administratorship was to "restore order in local 11-456, to secure an honorable settlement with the struck company, and to return all members of the group to work under a good contract."

The union is encountering difficulties in persuading Aurora to take back 21 fired employes and drop damage suits against 23 others. The international union sided with the strikers on these points.

Chicago deadlock . . . Threat of a Teamster strike against 350 marketing firms in the Chicago area grew last week.

Representatives of the union and oil companies met in another negotiation session last Tuesday and then recessed again until August 13 without making progress toward a new contract.

Teamsters driving gasoline and oil-tank trucks in the Chicago area have been working without a contract since July 1. Members of the big Chicago Local 705 of Teamsters voted last week to give their officials power to call a strike if negotiations break down. The Gary, Ind., local had voted a similar strike authorization earlier. The 10 locals involved in the negotiations represent 4,000 drivers in the Chicago marketing area.

Louis Peick, chief union negotiator, told Local 705 members preceding their strike vote that contract talks so far with the oil companies have not progressed toward a settlement.

The union is asking a 25-cent an hour increase over the present $2.75 hourly wage rate. Companies are standing firm on a no-wage-raise policy because of declining revenues. They also have asked for a change in overtime clauses to permit payment of overtime only after 10 hours in any one day or 40 hours in a week.

Peick reported union representatives have offered to pass up a wage boost this year if the companies will hold the line on gasoline and fuel prices.

Marketing officials estimate a walkout in the Chicago area would cause a rush to service stations which would deplete gasoline supplies in one day. Most service stations only carry a 2 to 3-dav reserve.

New wage goals? . . . Indications are growing that the OCAW's bargaining policy committee may reexamine the union's contract goals when the organization's annual convention opens next month at Long Beach.

The policy committee set present bargaining goals last February. They have met with firm resistance throughout the industry so far. All contracts now have either expired or been reopened for bargaining. They're being extended with a provision that negotiations may be resumed at any time.

Union officials last week made a new analysis of their goal and declared OCAW workers are due an hourly wage increase of 10 to 11 cents to offset cost-of-living increases since their last general wage boost.

This 10-11 cents, plus 3½% a year for productivity gains, total 20-21 cents an hour more which the union is seeking for its 105,000 members in petroleum and related fields.

The oil workers' last general wage hike was 6% granted in May, 1957.

Since then, OCAW says, the cost of living has risen 4%. The federal Government's latest consumers price index figure, according to the union, shows that it cost nearly $1.24 in June to buy the same goods and services that sold for $1 in 1950. The June increase was the twentieth in 22 consecutive months.

There's no hint at OCAW headquarters in Denver that oil industry units would settle for 5% wage increases recently negotiated with two gas utilities, Laclede Gas Co., St. Louis, and Milwaukee Gas Co. in Wisconsin.

Wage increases under the new contracts average about 12½ cents an hour. The agreements also include an additional half-holiday on December 24; improved hospitalization plans; increased sick leave; higher shift differential; vacation improvements for both working and retiring employes; advance notice of layoffs to the union; and improved dismissal and disability termination clauses.

OCAW headquarters, meanwhile, announced that meetings will be held Aug. 14-15 in Cleveland with officials from the International Chemical Workers to talk about possibility of merging the two unions.

CIG Case Goes Back to FPC

THE COMPLEX Colorado Interstate Gas Co. rate will be heard again by the Federal Power Commission.

The June 21 FPC decision which determined some of the issues in the 4½-year-old case was appealed by Colorado Interstate and parties opposing proposed increases.

The June order ruled the company was entitled to a 6% return and reopened rate disputes dating back to January 1, 1954 to include cost data for later years. It denied CIG's motion for a broader reopening of the record, disallowed a claim the company was entitled to include in its cost of service certain federal and state income-tax advantages arising from a 1952 merger, and held that the evidence did not show CIG was entitled to more than cost for its own gas computed under the rate-base method.

NPC Air Is Clearing

. . . according to statement issued by Seaton office. But oil men are unhappy with four of secretary's proposals.

A SOLUTION appears near in the dispute between officials of the National Petroleum Council and Department of Interior over new rules for the advisory agency.

Interior Secretary Fred A. Seaton said there was no "difference of substance" between the council and his department.

"I believe we can work out the problem to our mutual satisfaction," he added.

The dispute came to light when NPC officials asked Seaton to change four of his proposed rules for future operation of the council.

Seaton proposed the rules to give the Government greater control over work of the 100-man industry advisory group.

Council Chairman Walter S. Hallanan of Plymouth Oil Co., however, observed after studying the proposals that "the council is anxious to serve the Government, but is insisting that it must have the opportunity to do so under conditions that will enable it to do an effective job to protect itself and its members."

Hines Baker of Standard Oil Co. (N. J.) in a letter to Seaton said council officials are at odds with Seaton on four issues:

. . . Chairman of the council, its committees, and subcommittees. Seaton proposed a government cochairman for all meetings of the council and its committees and of subcommittees as the Secretary of Interior deems advisable. These would have "equal rights and authority" with the industry chairman of the council. Baker said this "leads to confusion." He proposed, instead, that the industry chairman preside.

The government cochairman could become chairman if he feels the discussion wanders off the subject submitted by the Government or becomes likely to involve antitrust law violations. The government cochairman could rule such discussion out of order and, if overruled, could adjourn the meeting.

. . . Call of meetings. Seaton proposed the government cochairman call meetings of the council, its committees and its subcommittes for which there is a cochairman. Baker called it "desirable" that the industry chairman call the meetings.

. . . Council's agenda. Seaton asked that this be formulated by the Government. Baker said "we are fearful" the wording fails to let the council and its agenda committee "refuse to consider a matter as improper."

. . . Agenda for committees. Seaton proposed the Government plan the agenda for meetings of committees and subcommittees which have a government cochairman. Baker thinks this "wholly impractical," although he said the subject matter dealt with by the committees must relate to an agenda matter initiated by the Government. He said provision might be made for government "approval or concurrence in such agenda" but added this will involve delays.

Baker's letter added:

"We have proceeded on the assumption that the Government desires impartial factual studies and analyses based on the independent judgment of the highly competent and qualified members of the petroleum industry.

"This can only be accomplished by permitting those in the industry charged with the duty of making such studies and analyses to assume a full measure of responsibility in persuading competent committee members to serve, calling meetings and insisting on attendance and active work, securing access to complex technological, operating and economic data, and preparing reports for government use."

Drilling Halts at Deep Tests

THE DEEP-HOLE derby slowed down last week.

Drilling was at a standstill at Phillips Petroleum Co.'s two Pecos County, Texas, wildcats. And Shell Oil Co. has reached contract depth at its deep Oklahoma test.

Phillips plans to run a new string of drill pipe at the 1 EE University, the world's deepest hole. With total depth at 24,357 ft., the company tested drill pipe and found it unsatisfactory.

A Phillips spokesman said the temporary shutdown is a preventive measure. Because of the extraordinary depth, the company is taking special precautions with drill pipe to avoid a fishing job.

Phillips will presumably continue to search for the Ellenburger after a new string of drill pipe is run.

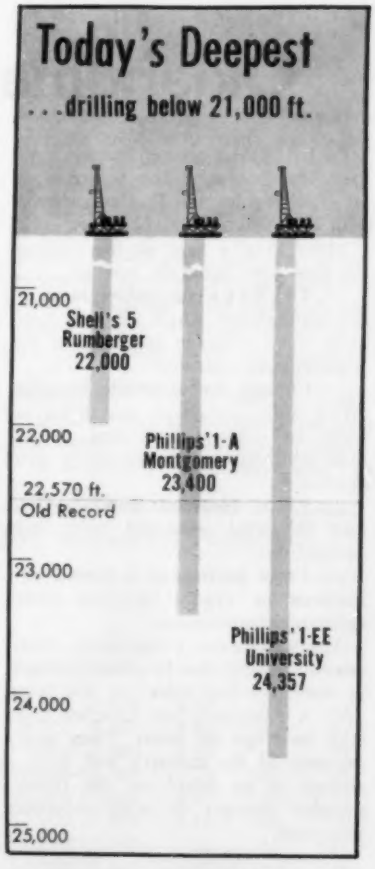
Montgomery testing . . . Just 30 miles from the 1 EE University, Phillips was running tubing to test the 1A Montgomery.

This well is the world's second deepest, with open hole at 23,000 to 23,400 ft. in the Ellenburger. A record string of casing was cemented to 23,000 ft. in July.

At still another deep Pecos test, Phillips testing was delayed at the 1-A Harral, because of a tubing leak. The Wolfcamp was perforated at 18,950 to 19,000 ft., with hole bottomed at 19,020 ft.

In Oklahoma's Elk City field, Shell was below 22,000 ft. at the 5 Rumberger, the state's deepest hole. Contract depth with Helmerich & Payne, Inc., is 22,000 ft.

A Shell spokesman said last week there had been no decision on whether to carry the hole deeper. Another point is uncertain: The company is not sure whether the bit is in the Springer objective or still in the Morrow.



Major Changes Proposed in Oklahoma's Oil

PRODUCTION

Minimum per well allowable is dropped. Instead, depth of well and lifting-cost factors are used in a new chart to determine allowables for wells in allocated pools.

Maximum allowable for unallocated pools probably will equal the minimum allocated allowable.

Rules on water floods are stricter and their allowables will be figured each 6 months.

Top gas-oil ratio is pegged at 3,500:1.

PURCHASING

Responsibility of Corporation Commission to determine reasonable monthly market demand is spelled out.

Monthly reports are required from purchasers and transporters, including truckers.

Common purchaser is required to take the legal allowable from his connections unless excused by the commission.

Commission is given authority to force a purchaser to extend his lines to add connections or to expand services.

A common purchaser or carrier is not permitted to abandon service without a permit.

Oklahoma Field Rules Updated—And

OKLAHOMA oil men last week got their first look at a proposed changed set of field rules, the first major overhaul of regulations in 12 years.

More than a year in the writing, the new rules generally aim to:

... **Tighten up enforcement** to eliminate abuses which oil men complain have crept in to penalize the conscientious operator.

... **Change the allowable formula,** giving more emphasis on depth of wells and lifting costs and putting mild restrictions on water-flood production.

... **Force common purchasers** to take the legal allowable from their connections.

... **Force purchasers to extend** connections or expand services under certain circumstances.

The Oklahoma Corporation Commission mailed the proposed changes to operators last week. At the same time it tentatively set October 6 to start hearings on them. Then every segment of the industry will have a chance to be heard on the recommended changes or offer substitute proposals.

The writing job ... Ferrill H. Rogers, the commission's conservation attorney, drew the job of revising the field regulations.

Rogers said he examined the rules followed by every other oil-producing state plus special studies made by commission, legislative, and industry groups before undertaking any revisions.

He claims the rules as revised would give Oklahoma the most up-to-date set of regulations in the industry. Much of the old regulations was retained, and Rogers explained he was guided in making the proposed changes by these general rules:

... **Putting more responsibility** on the operators themselves in seeing that drilling rules and procedures are followed.

... **Using a compulsory** surety bond or financial responsibility report and withholding of allowables as a means to enforce compliance.

... **Taking advantage** of the latest technical changes to devise fairer allowables and controls over water floods and multiple completions.

Rogers acknowledged several of the proposals will be controversial, especially the sections dealing with allowables and purchases. He said, however, the intention of the commission is to have rules that recognize trends in Oklahoma exploration and drilling, yet are fair to both the industry and the public.

Rogers noted that the allowable formula would mean less production for shallow wells, about the same for medium ones, and more for the deeper ventures. It recognizes that Oklahoma's future reserves are at the medium and deeper zones, he said.

He added that shallow and stripper producers shouldn't suffer greatly by the proposed allowable change. Their allowables still will be computed on a lease basis in unallocated areas. They also will share in any gains made from tighter controls over unrestricted production from water floods, pressure maintenance, or salt-water exemptions.

The proposal that purchasers be required to take the full allowable from their connections merely places in the formal field rules a policy which the commission has followed for several months. The policy is currently being challenged in court by Gulf Oil Corp.

The idea of forcing pipelines to tie in unconnected nearby wells long has been advocated by independent producers. The machinery for such a move is now provided in the new rules. It provides that in cases where the producer and purchaser can't agree on feasibility or allocation of costs of the line, an appeal may be taken to the commission. This agency after a hearing can order the connection and allocate costs.

Other changes proposed will have only minor effect on the industry's drilling, producing, and transporting activities.

Drilling ... Rule changes recommended for this segment of the industry are intended to assure that the

Regulations

DRILLING

Operator is made responsible to see that rules are followed in getting permit, submitting logs and reports, setting proper casing, drilling directionally, or completing in more than one pay zone.

Teeth are added by compulsory bonding requirement and withholding of allowables until compliance.

Men responsible for revamping Oklahoma's field rules are Corporation Commissioners (seated, left to right): Wilburn Cartwright, Ray Jones, and Harold Freeman and (standing) Ferrill Rogers, conservation attorney, Dan Dunnett, assistant director, and Massena Murray, director.

Toughened

public and offset operators are protected and the state is fully informed about the operations.

Bonding requirements for a contractor or operator are made compulsory instead of optional with the commission. A $2,500 surety bond for each well is required until the plugging is approved or the operator is released from the bond by the commission. In lieu of this, the operator may submit a $10,000 corporate surety bond covering all wells he may drill or a financial statement showing net worth in excess of the blanket bond.

The operator is held responsible to see that the drilling permit is obtained and all rules and regulations are followed in the drilling operations. The permit must be posted at the well site so it can be easily seen by a commission representative.

The operator must submit well logs and completion or workover reports to the commission. Failure to comply can mean he may be cited for contempt or his allowable may be held up until he does comply.

The proposed changes also make the operator liable for ascertaining where water strata are and setting suitable casing. In case fresh water later is found to exist below the casing, he must take measures to protect the fresh-water sands.

Time for filing application for directional drilling is cut from 30 to 10 days after drilling first starts. Thus, offset operators are notified, and the commission is allowed to determine the allowable factors. The operator also must make a well survey and furnish copies to the commission and offset operators within 30 days after completion of the directional well before he will be assigned an allowable.

For a multiple-zone completion, the operator must make application for the first one in a field and submit to a hearing before the commission. Later completions in the field may be made on application without a hearing.

The proposed rules also require the oil and gas conservation department to issue a monthly summary of all multiple completed zones in the state. These wells also must be tested once each 6 months.

Cable-tool drillers face very few specific changes in their rules. One suggested change gives the operator an option on casing. In wells drilled 1,000 ft. or less, instead of surface casing, the flow string may be cemented by the pump and plug or displacement method provided this will protect all fresh water strata. A new procedure also is set up for stripping the outer casing before abandonment.

Production . . . Chief changes in production involve the allowable formula and tighter controls over water floods.

A semiannual producibility test and

Oklahoma May Adopt This Allowable Formula

Depth of well*	Factor	If basic allowable is (in barrels) 25 bbl.	20 bbl.	Depth of well*	Factor	If basic allowable is (in barrels) 25 bbl.	20 bbl.
0- 2,500	1.00	25	20	8,500- 9,000	3.10	78	62
2,500- 3,000	1.20	30	24	9,000- 9,500	3.35	84	67
3,000- 3,500	1.30	32	26	9,500-10,000	3.60	90	72
3,500- 4,000	1.40	35	28	10,000-10,500	4.10	102	82
4,000- 4,500	1.50	37	30	10,500-11,000	4.60	115	92
4,500- 5,000	1.60	40	32	11,000-11,500	5.35	134	107
5,000- 5,500	1.75	44	35	11,500-12,000	6.10	153	122
5,500- 6,000	1.90	48	38	12,000-12,500	7.10	177	142
6,000- 6,500	2.05	51	41	12,500-13,000	8.10	203	162
6,500- 7,000	2.20	56	44	13,000-13,500	9.10	227	182
7,000- 7,500	2.40	60	48	13,500-14,000	10.10	253	202
7,500- 8,000	2.60	65	52	14,000-14,500	11.10	277	222
8,000- 8,500	2.85	71	57	14,500-15,000	12.10	303	242

*Applies to allocated pools.

well-status report also must be made on every well to provide the commission with a better inventory of the state's wells.

Oil pools are classified into four types, instead of two. They are allocated where production is regulated for each well, unallocated where production is regulated on a lease basis, pressure maintenance and unit operations, and secondary-recovery projects.

Allowables for allocated wells may be computed from a depth-bracket chart. The basic allowable is assigned the well of 2,500 ft. or less. By means of a factor assigned each 500-ft. depth bracket, deeper wells get an increasingly larger allowable. The factor reflects more than depth alone. Consideration also is given lifting costs, which won't increase proportionately with depth (see chart). The plan is very similar to a formula followed by Kansas authorities.

For unallocated pools, the commission will, under the proposals, set a per-well allowable which will not result in production of oil in excess of current market demand. This will apply only to producing wells but may be accounted for on a lease basis. In practice, officials expect the unallocated per-well allowable will be about the same as the basis allowable used for allocated wells. The important change, however, is that a fixed minimum allowable policy is abandoned, and unallocated pools are made subject to market demand.

Water floods . . . Tighter control of water-flood production is one of the major changes proposed in the new rules.

To qualify as a water flood, volume of water injected into the reservoir must exceed the oil produced. Allowables are set every 6 months for the succeeding 6 months, and a close control is kept on the number of wells for which production is allowed.

Two methods of determining the water-flood allowable are proposed:

. . . Percentage of normal oil-well allowable which is granted for like depth in pools for primary production.

. . . Formula which takes the number of allowable wells, multiplies by the average daily allowable granted similar primary wells in the past 6 months, and then multiplies by the number of days in the 6-month allowable period.

Production in each calendar month, however, may not exceed 25% of the 6-month allowable unless approved by the commission.

Wells producing from a different reservoir than the one being flooded may not produce any part of the project's allowable. Their production must be measured and reported separately. Nor can a well in the project produce more than the allowable for offsetting wells outside the lease or unit boundary.

Other allowable rules . . . Size of discovery allowables also would be changed under the rule proposals.

The recommendation calls for a discovery allowable of twice the daily allowable for wells in pools of comparable depth and characteristics. Allowable period would cover only 30 days. Present rules call for a maximum 150 bbl. daily discovery allowable for 60 days.

Overage may not exceed 15% of the allowable and must be deducted from the next allowable period. Underage also may not exceed 15% Any more than that will be cancelled. It must be made up by the second period or the allowable is lost. Where underage occurs from purchaser pipeline proration, however, it may be carried till balanced by equal runs.

Purchasing . . . A formal plan for determining reasonable market demand for Oklahoma oil for the first time is set forth in the new rules.

The commission informally has been following the plan at its monthly allowable hearings. The proposed rules merely formalize the plan and outline the factors to be considered.

The two most important changes in the marketing and transportation section of the proposed rules are:

. . . Compulsory purchasing. The new rule says that common purchasers must buy "all the lawfully produced petroleum in the vicinity of, or which may be reasonably reached by its pipeline or gathering branches, without discrimination in favor of one producer or one person as against another" unless legally excused by the commission.

. . . Extending connections. If a producer wants a connection with facilities of a common purchaser or common carrier and can't reach an agreement, the commission may take up the dispute on request of either party. After a hearing, the commission may order the expansion of facilities and the terms.

These two changes are backed up by a third proposed revision. It declares that no pipeline, transporter, purchaser, taker or carrier of oil, gas or other hydrocarbons in their natural state may abandon all or any part of its facilities in Oklahoma without permission of the commission.

CATC Is Drilling

first wildcat on expensive Louisiana offshore block.

THE CATC GROUP has spudded the first wildcat on one of the most expensive blocks ever leased in the Gulf of Mexico.

The test, projected to 14,000 ft., is in Block 208, Eugene Island area, nearly 50 miles off the Louisiana mainland. Location is in about 96 ft. of water.

In 1955 the CATC Group paid the federal Government more than $9,400,000 in bonuses for two leases covering the 5,000-acre block. Although the bids were well short of individual records, their total is believed to be the second greatest ever received for a single 5,000-acre block in the Gulf of Mexico.

Partners in the CATC Group are Continental Oil Co., the operator, Atlantic Refining Co., Tidewater Oil Co., and Cities Service Production Co.

The test is about 6 miles southwest of nearest production in Block 191, Eugene Island area.

Contractor on the job is C. G. Glasscock Drilling Co., which is using its big mobile platform, "Mr. Gus II." The test was below 5,000 ft. last week after setting a near-record drilling pace during the first few days following spudding. The operators reported 2,050 ft. was drilled in 1 day.

PIPELINE

Jayhawk Pipe Line Co. is studying a proposal to build 140 miles of 6-in. feeder line from its Meade, Kans., terminal to connect fields in southwestern Kansas. The project would cost $1,500,000 to $2,000,000. The Jayhawk board of directors is expected to make a decision this month.

One leg of the line would extend 90 miles westward to Interstate field in Morton County, bordering the Oklahoma and Colorado lines. The other would connect Pleasant Prairie field in Haskell County. Jayhawk is owned jointly by Colorado Oil & Gas Corp. and National Cooperative Refinery Association. It's scheduled to start operating next month, delivering crude to McPherson and Valley Center, Kans.

Tidewater Natural Gas Co., Wilmington, N. C., plans to spend $3,500,000 to build 200 miles of pipeline to serve five cities in North Carolina. A contract has been awarded to C. N. Flagg & Co. to

How AGA Sees the Future

Year	Sales (millions of therms)	Customers (thousands)	Revenue (millions of dollars)	Expenditures (millions of dollars)	Pipelines* (thousands of miles)
1958	81,120	31,340	4,431.6		564.1
1959	85,640	32,200	4,787.2		583.7
1960	90,320	33,070	5,161.8	2,235	604.1
1961	95,440	33,970	5,572.3	2,257	625.3
1962	100,540	34,890	6,003.2	2,462	646.8
1963	106,090	35,850	6,469.0	2,586	670.0
1964	111,900	36,870	6,961.1	2,739	694.5
1965	118,200	37,920	7,499.8	2,860	719.9
1966	124,680	39,030	8,069.7	3,026	746.2
1967	131,430	40,180	8,674.2	3,169	773.4
1968	138,710	41,360	9,318.8	3,302	801.9
1969	146,350	42,570	9,994.5	3,441	831.2
1970	154,000	43,820	10,704.7	3,597	861.1

*Includes gathering, transmission, and distribution lines.

Gas Continues Record Growth

THE GAS INDUSTRY expects a record year in 1958 with the trend continuing through 1970.

The American Gas Association in an annual survey reports the industry will spend $1,868,000,000 this year in expanding all facilities. This will compare with 1957's previous record of $1,772,000,000 for a 14.2% increase.

Biggest single item of investment this year, according to the AGA, will be in transmission line construction. These expenditures are expected to total $918,000,000 against $753,000,000 a year ago.

One reason for the big jump in construction of transmission lines this year is the hangover of construction planned for 1957.

Calco Will Drill

off Florida coast if state wins jurisdictional hassle.

THE CALIFORNIA CO. has revealed tentative plans to start drilling on Florida leases covering about 4,500,000 acres, mostly in the Gulf of Mexico.

The company announced it had assumed a qualified commitment to drill 21,000 ft. of hole under terms of a 1955 contract with Coastal Petroleum Co.

Calco plans no immediate drilling in the area since both the state and federal governments claim jurisdiction over much of the acreage. The dispute is now before the U. S. Supreme Court.

Officials of The California Co. indicated that the proposed drilling program may be abandoned or curtailed if the suit is not settled in favor of the state by next July 1.

Under the 1955 contract, Calco could earn 50% interest in each 100,000-acre block on which it completes a producing oil or gas well (OGJ, Aug. 22, 1955, p. 101). Calco has done geological and geophysical work in the area since 1955.

The Coastal Petroleum leases were issued by the trustees of Internal Improvement Fund of the State of Florida. The leaseholder is a subsidiary of Coastal Caribbean Oils, Inc.

BRIEFS . . .

construct the line. Construction will start this fall. Tidewater will convert its facilities from propane to natural gas, which will be transported to North Carolina by Transcontinental Gas Pipe Line Corp.

Eastern Shore Natural Gas Co. has started construction of a 130-mile, 6 and 8-in. line from the Transcontinental Gas Pipe Line Corp. system in Maryland across Delaware. Buchanan Pipe Line Construction Co., Birmingham, Ala., has begun laying the 6-in. section. The contractor expects to finish in 90 days. Eastern Shore plans to take 5,000,000 cu. ft. daily for resale and will also transport 4,000,000 cu. ft. which Delaware Power & Light Co. has purchased directly from Transco.

Service Pipe Line Co. is connecting nine oil leases in Burke County, North Dakota, to its Tioga gathering system in the Williston basin. Service has been transporting 38,000 bbl. daily to its Mandan, N. D., refinery from wells in Mountrail, Williams, Burke, and McKenzie counties. The extension of 7 miles of 4-in. and 3 miles of 3-in. will bring to 490 the number of leases from which Service gathers crude oil in North Dakota.

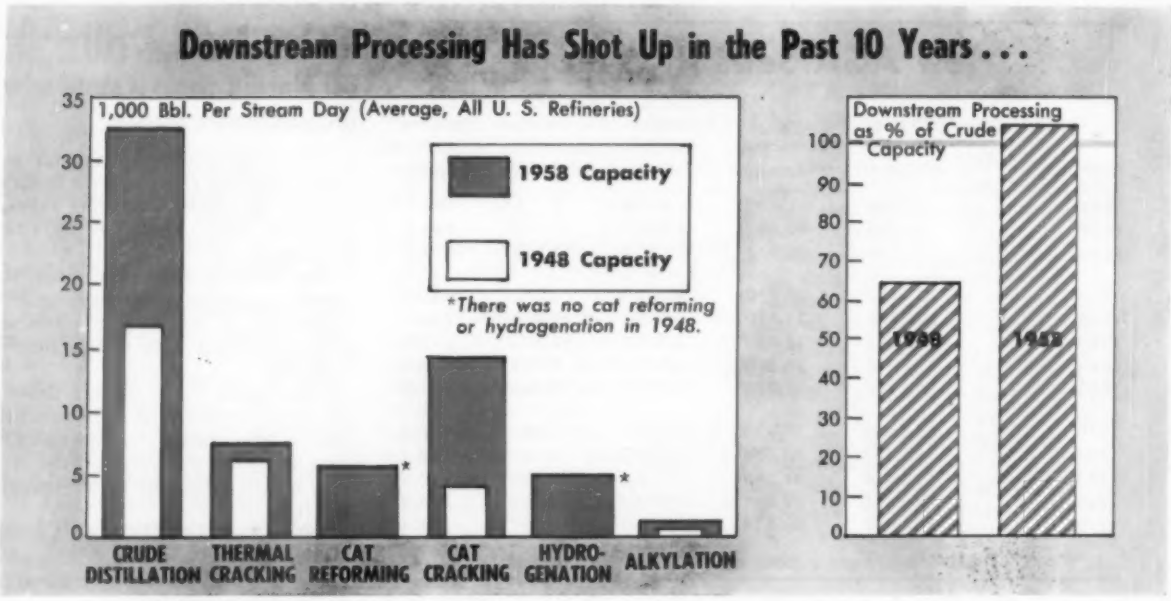
Kenland Oil Co., Tulsa, is expanding its crude-oil brokerage and transportation operations by taking over Groendyke Petroleum, Inc., Enid. The new company is known as Cameron Crude Oil Co., with Dan W. Cameron as president. Hugh C. Steele, vice president and general manager for Groendyke, is vice president of the new firm. P. J. Schaff is vice president and secretary-treasurer and W. D. Anderson is assistant secretary-treasurer. Cameron operates a gathering and trucking system in the Illinois and Denver-Julesburg basins and Oklahoma, serving six states.

Also for Pipeliners . . .

IN THE NEWS: Pipeliners soon will begin to feel the added cost of the rise in steel prices—line pipe has gone up $6 a ton (p. 65) . . . Proposed deal involving El Paso Natural, Colorado Interstate, and Pacific Northwest would move Oklahoma and Texas gas to California as well as Canadian and Rocky Mountain gas (p. 66) . . . Oklahoma's proposed new field rules set up machinery for forcing connections and expansion of service by common carriers and common purchasers (p. 70) . . . AGA survey indicates 1958 will be another record construction year for the gas industry (p. 73).

A complete project list is published the last issue of each month. New jobs and contracts are reported each week in Pipeline Briefs.

PLUS THIS TECHNICAL REPORT: Submarine trenching proves practical for offshore and water-crossing work (p. 111).



A Growing Trend in Refining: More

Larry Resen
Refining Editor

HIGHER OPERATING costs and a more complex processing arrangement are two big things ahead for refiners. Why? The continued growth of downstream processing.

A quick comparison of refining today and 10 years ago shows this trend: Crude capacity once overshadowed downstream processing capacity. Now the opposite is true.

Ten years ago the nation's refineries were able to meet market requirements with about 4,000,000 bbl. of capacity downstream from the crude-distillation units. This was devoted to converting various streams to finished products. Total crude capacity then was 6,250,000 bbl. per day.

But for today's highly competitive market, refiners are using 10,000,000 bbl. of downstream processing with only 9,800,000 bbl. of basic crude capacity.

In 10 years this additional processing has jumped from 64% of crude capacity to 104%.

Of still greater significance is the fact that the ratio is much higher in the newest refineries. Downstream processing in five new refineries is 171% of crude capacity. And these plants are the guideposts for the future.

This buildup of downstream processing during the past 10 years has been costly. Construction costs have risen sharply during the 10 years. Nelson's construction cost index jumped from 132.5 in 1948 to 210.9 in 1958 (1946=100). Capital expenditures by refiners during this period have totaled almost $7 billion.

The increasing complexity of the average refinery is a reflection of changing motor-fuel requirements and increased competition.

While motorists' needs were satisfied by a regular-premium spread of 81-87 research octane numbers 10 years ago, today's octane spread runs from 91 to better than 100. And this doesn't include the superpremium gasolines that have entered the market in the past couple of years. Competition and new engine designs have stepped up the pace of the octane race.

The advent and startling growth of hydrodesulfurization, for example, was stimulated by competition in the marketplace. More than one refiner has commented that his hydrogenation capacity would be a lot lower if it were not for a competitor threatening to beat him out of the market with a cleaner fuel.

Composite plant . . . A comparison of the typical plant in 1948 and today will show the trend in complexity.

To simplify the treatment, lube oil, polymerization, and specialty operations have been disregarded in all of the totals used. Vacuum-unit capacity has also been omitted since it doesn't involve conversion of feed streams directly into products. The totals and breakdown of capacities are based on the number of refineries in existence and their principal processing conversion units.

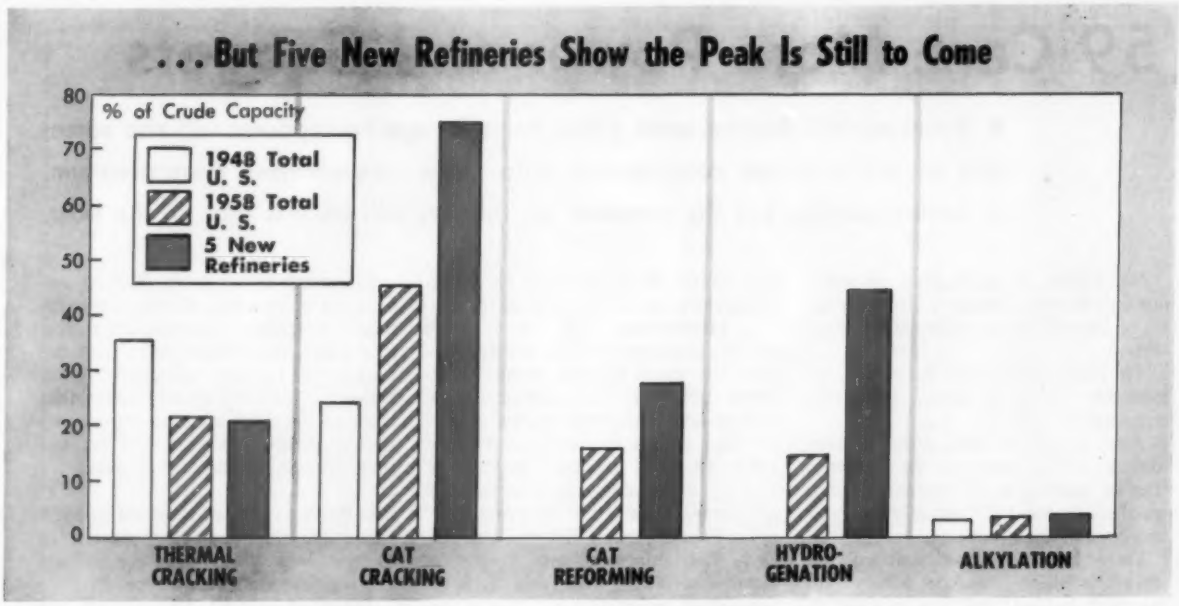
Ten years ago, there were 370 operating plants in the U. S. with a total crude throughput of 6¼ million barrels daily. The 1948 composite refinery had a throughput of 16,900 bbl. of crude; 6,160 bbl. of thermal cracking, visbreaking and allied units; 3,950 bbl. of catalyst cracking capacity; and about 440 bbl. of alkylation capacity, much of which was in standby wartime units.

Compare this with today's 298 refineries that can process slightly over 9.8 million barrels in a stream day.

The composite plant of today has a throughput capacity of 32,500 bbl. of crude; 7,380 bbl. thermal cracking; 14,200 bbl. catalytic cracking; and 1,040 bbl. alkylation capacity. In addition, it has 5,100 bbl. of catalytic reforming capacity and 4,500 bbl. of hydrogenation capacity. Both of these latter processes having experienced their growth in the past 5 years.

A better comparison can be gained by expressing the capacity of the downstream units as a percentage of crude throughput capacity. Thermal cracking capacity, which used to amount to 36% of the total U. S. crude processing capacity, has declined to 21½% in 10 years.

Catalytic cracking, the wheelhorse of the refinery, has increased from 23 to 46%. Catalytic reforming has come from nowhere to 16% and hydrogenation units have increased from



Downstream Processing

nothing to almost 14% of crude-oil capacity.

On a percentage basis, alkylation hasn't varied much, now running about 3% compared to 2½%. However, many of the units in existence in 1949 were idle, standby wartime units. Since then there has been a significant gain in alkylation capacity, with alkylate—a high-priced component—showing up more and more in motor fuels. It previously was restricted to high-cost avgas.

Future trends . . . As graphic as these comparisons are, they are clouded somewhat since total U. S. capacity figures were used for arriving at the percentage relationships.

This approach naturally includes plants which are small and outmoded, but do not affect the over-all figures. Their presence in the totals works against the upswing in the downstream units.

A much better glimpse of the future can be obtained by using processing capacities of units in five plants completed in the past few years (see chart).

All but one were built from scratch and designed for modern processing. The exception, Sohio's plant at Toledo, has all new units except the alkylation plant, and for all practical purposes it is brand new. The other four plants are Tidewater's and American Oil's East Coast refineries at Delaware City and Yorktown, and Shell and General Petroleum's plants at Anacortes and Ferndale, Wash.

Composite figures on these five plants give a good indication of what to expect in the future.

Three processes — catalytic cracking, cat reforming, and hydrogenation —have made big strides in recent years, but will make even bigger gains according to the composite of the five plants.

Catalytic cracking is perhaps the most interesting example of what is expected in the future. Many people have regarded capacity of these units as approaching the saturation point. Total capacity was almost up to 46% of crude charge capacity in 1958. However, in the five plants catalytic cracking accounts for an amazing 75% of total crude capacity.

Catalytic reforming also is much higher in these new plants, being about 27½% of crude capacity compared to 16% in the total 1958 plant comparison.

Hydrogenation in these plants has made the biggest strides. It is 44% of crude capacity in the new plants, compared to less than 14% in the 1958 totals. Alkylation did not show any change, being about 3% of crude capacity in both cases.

As might be expected, thermal cracking capacity as related to crude capacity is down in the five new plants. The 20% thermal capacity compares to 21½% in existence in all plants in the U. S. in 1958.

Other processes such as isomerization are beginning to show up, and will help swell downstream capacity.

Bright spots . . . While these downstream units have cost money, the refiner hasn't been completely devoid of benefits.

He's naturally been able to upgrade his products and improve yields in some cases to remain on a competitive footing. Beyond this he has gained some leeway in his octane position, and most plants are not pinched so far as octane numbers go.

He's also been able to take advantage of low-grade, low-cost crude stocks and get a better realization from running these crudes. For instance, a West Texas sour crude will run as much as 75 cents lower than Gulf Coast crude. With hydrogenation capacity available the refiner can run these stocks and get a much higher realization than with the sweet coastal crude, even taking into consideration transportation and desulfurization processing costs.

A comparison trend in all of this has been the emphasis on larger and larger individual units. The 100,000-bbl. unit capacity figure has been surpassed both in crude and catalytic cracking units. And the 50,000 plus per day unit is not uncommon anymore. The object here, naturally, is to get cost-per-barrel down as much as possible, and it's hard to find a better and simpler route than the king-size unit.

In the long haul, the refiner is working to hold down costs. The increased complexity of his plant necessarily works against this end. Hence, the steady pressure to receive more money for his products. A pressure which promises to be around for some time to come.

'59 Cars: More Power and Gadgets

• Economy will be the sales pitch, but average horsepower will rise some, and so will average compression ratio. New cars will need more premium, of better quality, but the pressure on refiners will be less than in the past.

NEITHER a sharp drop in sales nor a foreign invasion is altering U. S. automobile manufacturers' convictions.

They still believe that the American motorist wants a sleek, powerful, comfortable car.

And, despite a 28% drop in sales and a 100% increase in imports, they're putting a bit more of such qualities in the 1959 models that will soon make their bow.

Only Buick has yet reached the unveiling stage, but the others will be close behind. All are moving up their introductory dates in the hope of capitalizing on a reviving market and the urge to buy new models.

Chrysler is scheduled to disclose its 1959 cars the first week of September. Ford, expected to be the last of the Big Three, should be out by October 1, so that all the major manufacturers will be off to their earliest postwar start.

While no manufacturer is tipping his hand, it now appears that in the new models:

...Compression ratios will be somewhat higher. None is expected to exceed this year's top, 10.5:1, but others will move up to it. The average is expected to be between 9.65:1 and 9.75:1, against this year's 9.47:1. This would be an increase of .15 to .25 against the 1958 jump of .51.

...Horsepower will be a little greater. Economy will be stressed this year but there will be some horsepower increases. The average of the new models is expected to hit around 270 hp. against the 1958 average of 258.6 hp. This expected increase of 11.4 hp. would compare with the 21.9 hp. jump of the 1958 models.

...Fuel injection will be soft-pedaled. Two things militate against its expansion: High cost and lack of competent maintenance. It was optional on a half dozen 1958 models against two in 1957. It is not expected to expand and may not even hold its own this year.

...Carburetion will be more complex. Two four-barrel and three two-barrel carburetors popped up on quite a few 1958 models and will probably be used at least as extensively on the 1959's. It's one way to get higher horsepower.

...Gadgets will increase. Air suspension, power steering and brakes, air conditioning, etc., are expected to be somewhat more plentiful. Air suspension, latest added drain on power, is expected to be confined more and more to rear wheels as an offset to exceptional loads.

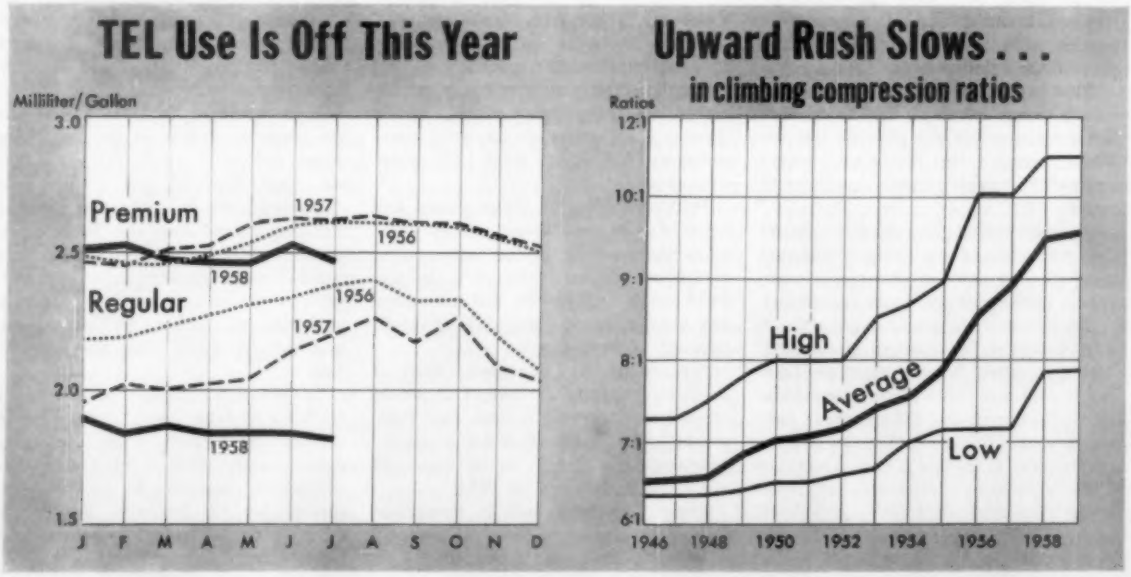
In setting this pattern, Detroit appears to be ignoring foreign competition. American manufacturers feel that their six-cylinder cars are the answer to foreign "economy" competition. They are acutely aware that sales of sixes did increase, in proportion to eights, this year, but far less than enough to indicate a trend.

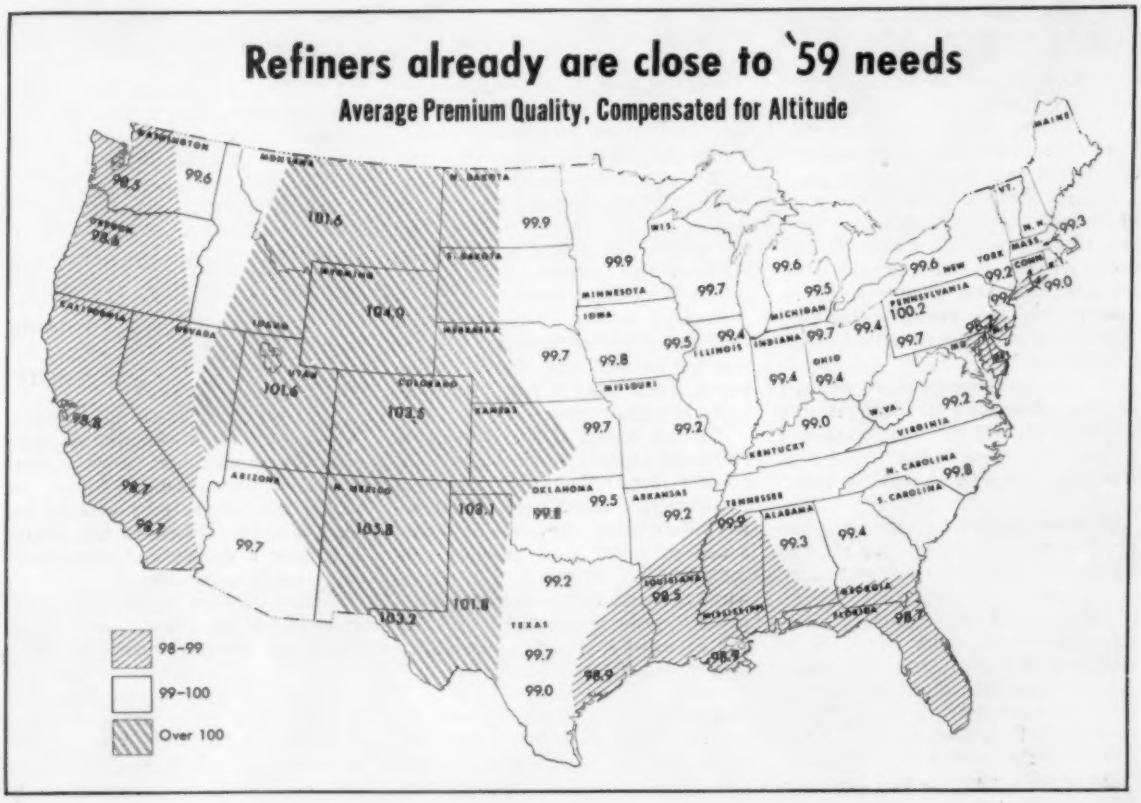
The Buick ... Buick unveiled its 1959 models to the press at a preview in Detroit July 30. It was the earliest postwar introduction on record.

Since almost all new models are due to be out by October 1 or thereabouts, the last quarter is expected to be by far the best of the year in sales. New-car sales have picked up after a poor first half and, with the stimulus of new models, should hit a fourth quarter high.

Buick has completely renamed and restyled its line for 1959. Instead of the Special, Century, and Roadmaster, it will be Le Sabre, Invicta and Electra. All are lower and bigger in appearance. They will go into production this month and on sale in mid-September.

Technical details were not disclosed for the public at the preview but, because it was brought out first of all GM cars, Buick is expected to get





the big push from General Motors. Its compression ratio and horsepower are expected to increase more than the average. This would put the former at this year's high, 10.5:1, and lift the latter to well over this year's 300.

All other General Motors makes, with the likely exception of Chevrolet, are expected to be bigger and more powerful. The 1958 Chevrolet held its position better than any other Big Three make and is less in need of a shot in the arm than the others.

Chrysler cars are expected to go up some both in compression ratio and horsepower too. The Dodge Coronet 6 and the Plymouth 6 had an 8.0:1 compression ratio in 1958, lowest of all the models made by the Big Three. None of the 1958 Chrysler models exceeded the 10.0:1 ratio.

Since only one of the Ford Motor Co. cars had less than the peak 10.5:1 ratio, the least change in this field is expected in this line. The 1958 Mercury, Edsel, Lincoln and Continental all had 10.5:1 ratios and the Ford Fairlane 500 had a 10.2:1 option. The others ranged from 8.6:1 on the six to 9.5:1 on the standard Fairlane 500.

It appears, therefore, that there will be no breakthrough above the 10.5:1 level this year. If there is, it is likely to be confined to power pack optionals.

Fuel injection . . . Fuel injection may not even hold the progress it has made.

Chevrolet and Pontiac, among the General Motors cars, as well as Chrysler, Dodge, DeSoto, and Plymouth, among the Chrysler products, offered it this year. It is credited with adding 10 to 20 hp. but the added cost, $400 and up, did not tempt many buyers.

Customer complaints did not help fuel injection. One manufacturer reportedly had one complaint for each car so equipped. The number of complaints, plus the inability of many garages to service fuel-injection systems, argue against its extension.

While fuel injection may die aborning, other devices that affect gasoline consumption are expected to increase. These include power steering and brakes, air suspenson, air conditioning, etc.

The trend to higher torques which has been steady for years is expected to continue. Certainly the use of multiple carburetors, used so widely on the high-powered 1958 models, will.

Economy? . . . The net sum of these factors is just a little more gasoline consumption per mile traveled.

This tendency counters the claim of economy that is expected to be stressed more than ever by all manufacturers. However the U. S. manufacturer is yet to be convinced that economy is really a strong point.

The importation of close to 500,000 foreign cars this year tends to dispute that contention. But the U. S. manufacturers feel that the exotic or snob appeal has more to do with the foreign cars' acceptance than economy.

Figures on sales of U. S. 6-cylinder cars tend to bear them out. The bare Ford, Plymouth, or Chevrolet 6-cylinder "company" car is bigger and more powerful and only slightly more expensive in first cost than many foreign cars. Yet, while its proportion of U. S. sales did increase slightly in 1958, the increase was far less than enough to indicate a pronounced trend toward economy.

Chrysler's deal with Simca gives all three of the major U. S. manufacturers a tie-in with European produciton. Though both Ford and General Motors are selling imported makes, it will take another year and more conviction before any of the Big Three enters the really little car field.

Effect on oil . . . The sum of the evidence is that more of the 1959 cars will require premium gasoline—of a

little better quality—than their immediate predecessors.

If compression ratios go up no more than .25, then an additional half octane, research, will do the trick. At least one major company feels that is precisely what will be required of the industry in the coming year.

Detroit plans to make a big point of fuel economy. It expects to achieve this through leaner carburetion and hotter engines. But to make this gain, the new cars will require a higher-quality fuel. This would be true even without the expected increase in compression ratio.

So the fuel economy move will add another dimension to the refiner's problems. It will put some additional pressure on the oil industry, although it will be less than in previous years.

The octane picture . . . The oil industry this year has been catching its breath and letting the automobile industry catch up.

The average quality of gasoline throughout the country, according to Ethyl's July survey, was 98.5 RON for premium and 91.2 for regular. Both were a mere 0.1 octane higher than as of December 31, 1957.

This slight increase is in marked contrast with what has been going on for years. In the same period of each of the preceding 4 years, premium rose from 0.8 to 1.5 octanes and regular from 0.5 to 1.2 octanes.

While quality on a nation-wide basis has not changed much, there have been some pronounced swings within the country. The West Coast as a whole has gone up, with July averages there 0.7 to 1.3 octanes above December figures. Many cities east of the Mississippi have backed off from their December highs to offset the West Coast gains.

Another marked change has been the lessened use of tetraethyl lead for boosting octanes (see chart). Its use has declined from a year ago, especially in regular grade.

The big reason is the increase in reforming capacity which has made it possible for refiners to put more catalytically cracked stock into regular. Reforming capacity has been added to faster than gasoline consumption has increased, a condition which will not be permanent. Cheapness still recommends the use of TEL and its use will go up as octanes are harder to find.

The future . . . Octanes will keep going up. Right now 100 octane plus motor fuel or its equivalent is available to motorists throughout the country. It's available as such in at least seven premium grades and all the superpremium or third grade brands in most of the country.

Elsewhere it's available where altitudes have the effect of increasing the sea-level octane of the gasoline. And gasoline of this quality will satisfy 95% of the cars today.

Since this relatively comfortable position exists and since the incentive to pour it on in an octane race is not present now nor likely to be in the near future, it will probably be some time before another sharp, sustained increase develops. Octanes will go up but, for the near future, at a slower rate than in recent years.

They will keep going up of necessity as new, high compression cars gradually replace old, low-compression cars. This condition insures an annual increase in pool octanes for years to come. The end of this parade is at least a decade and almost certainly much further away.

Today's gasoline is about 85% tailor-made. When rumble, wild ping, thud and possibly other problems caused by high-compression cars become more acute, that percentage will close in on 100. It means that the gasoline of tomorrow will be an ever more complex article than it is today and, at the same time, a more costly one.

Import Quota Bids Mushroom

A BOOST in imports totaling 601,764 bbl. daily is asked in quota applications on file with Capt. M. V. Carson, Jr., oil imports administrator.

Fourteen of the applications are from present importers. They ask to increase their quotas by 208,080 bbl. daily.

Sixty-two applications are from companies wanting to import oil for the first time. They seek to bring in 393,684 bbl. daily.

Carson plans hearings on the requests during September, but has yet to set a date. He has ruled that companies lacking a refinery are not entitled to an import quota. But others administering the program feel a company that has invested in foreign production also is entitled to a quota.

All the requests are for imports into Districts 1-4. At present, the total quota for the area is 713,100 bbl. daily.

Here is a Department of Interior list of companies now importing which have asked increases in their quotas:

Shell Oil Co., New York; Southwestern Oil & Refining Co., Corpus Christi, Tex.; Phillips Petroleum Co., Bartlesville, Okla.; Clark Oil & Refining Co., Milwaukee; Pure Oil Co., Chicago; Bay Refining Co., Saginaw, Mich.; Crown Central Petroleum Corp., Baltimore; Delta Refining Co., Dallas; The Texas Co., New York; Danaho Refining Co., Dallas; Ingram Oil & Refining Co., New Orleans; Murphy Corp., El Dorado, Ark.; Atlantic Refining Co., Philadelphia; and Tennessee Gas Transmission Co., Houston.

The 62 companies who have requested import quotas for the first time are:

Vickers Petroleum Co., Wichita, Kans.; Suntide Refining Co., Corpus Christi, Tex.; Mid-America Refining Co., Chanute, Kans.; Rado Refining Co., McAllen, Tex.; Laketon Asphalt Refining Co., Evansville, Ind.; Matagorda Corp., Shreveport, La.; Forest Colombian Corp., Bradford, Pa.; Coastal Oil Co., Newark, N. J.; Monsanto Chemical Co., Houston; Naph-Sol Refining Co., Muskegon, Mich.

Marine Petroleum Co., St. Louis; Western Crude Marketers, Inc., Denver; Delhi-Taylor Oil Corp., Corpus Christi; Cosden Petroleum Corp., Big Spring, Tex.; Union Oil & Gas Corp., Houston; Allby Asphalt & Refining Corp., Hammond, Ind.; Great Western Producers, Inc., Irving, Tex.; Western States Refining Co., North Salt Lake City, Utah; American Independent Oil Co., San Francisco; South Hampton Co., Houston.

Mayfair Minerals, Inc., McAllen, Tex.; Allied Materials Corp., Oklahoma City; Sak-Dak Crude Import Co., Minot, N. D.; L. Sonneborn Sons, Inc., New York; Pontiac Refining Co., Corpus Christi, Tex.; El Paso Natural Gas Production Co., El Paso, Tex.; Vulcan Asphalt Refining Co., Cordova, Ala.; Logue & Patterson, Dallas; Leonard Refineries, Alma, Mich.; Western Natural Gas Co., Houston; American Petrofina, Inc., New York.

Seminole Asphalt Refining, Inc., St. Marks, Fla.; Lakeside Refining Co., Kalamazoo, Mich.; Paluxy Asphalt Co., Dallas; Crystal Refining Co., Carson City, Mich.; Petroleum Specialists, Trenton, Mich.; Rock Island Refining Corp., Indianapolis, Ind.; Advance Refining Co., Centralia, Ill.; Pontiac Eastern Corp., Corpus Christi, Tex.; Frontier Refining Co., Denver; Union Oil Co. of California, Los Angeles.

Hunt Oil Co., Dallas; Southland Co., Yazoo City, Miss.; Ashland Oil & Refining Co., Ashland, Ky.; Skelly Oil Co., Tulsa; Gladewater Refining Co., Gladewater Tex.;

Howell Refining Co., San Antonio, Tex.; Phoenix Refining Co., Inc., San Antonio, Tex.; Eddy Refining Co., Houston; Indiana Farm Bureau Cooperative Association, Mt. Vernon, Ill.; Pacific Petroleums, Ltd., Calgary, Alberta, Canada.

Southland Oil Co., Dallas; Southwest Grease & Oil Co., Inc., Wichita, Kans.; Husky Hi-Power, Inc., Cody Wyo.; Bell Oil & Gas Co., Tulsa; Ben Franklin Refining Co., Tulsa; Texas Calgary Co., Abilene, Tex.; McBride Oil & Gas Co., Brownsville, Tex.; Derby Refining Co., Wichita, Kans.; Col-Tex Refining Co., Big Spring, Tex.; Cactus Petroleum, Inc., Houston; Petroleum Products Co., Lueders, Tex.

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Trade Bill Readied

. . . for President's signature. National security clause revision expected to lead to curbs on products imports.

CONGRESS has hammered out a foreign trade bill containing a national security clause that many feel will lead to curbs on imports of finished petroleum products. The measure has an unprecedented 4-year life.

House-Senate conferees drew up the final version last week. It is expected to reach the President's desk this week after passage by both houses.

The national security clause calls upon the President when he finds it necessary to restrict imports of an article also to restrict imports of derivatives of the article. Such restrictions, however, still are left up to the President's discretion.

The clause also sets up additional yardsticks for measuring whether imports are excessive and hurting a U. S. industry and the national security. One new test is the "investment, exploration, and development necessary to assure" growth to meet future needs.

The bill also allows the President to:

. . . **Negotiate tariff cuts** up to 20%. These may be made through reciprocal agreements after talks with other nations any time within the next 4 years. The reductions then may be spread over a 4-year period but are limited to a maximum 10% in any 1 year.

. . . **Overturn Tariff Commission** findings under the "escape clause." But Congress can then overturn the President by a two-thirds vote of both houses within 60 days.

The Foreign Trade Act has been in the law for 24 years, and it has been extended each 3 years by Congress. This year's extension marks the longest ever made, but it is less than the 5 years asked by the President.

The act has become the authority for the voluntary program to limit crude-oil imports in the name of national defense.

Russell B. Brown, counsel of the Independent Petroleum Association of America, predicts curbs on imports of finished oil products also will result.

"If the intent of the law is carried out," he said, "oil products will be restricted in proportion to the restrictions on crude oil.

"I think the bill does everything that the legislative group could do to limit imports except set a specific amount and require it to be done by force."

He recalled that the IPAA asked Congress to write in that imports of both crude oil and products shall be held to the 1954 ratio.

"If oil imports are not limited to the amount proper to preserve the domestic industry," he added, "the responsibility rests directly with the administrative body. The legislature has given all the direction and the authority the administration can ask for."

Long Wait Pays Off

with apparent discovery by Texaco off Louisiana coast.

THE TEXAS CO. has at least one apparent discovery on a large block off the coast of Louisiana where the company waited more than 20 years to drill.

Although the test is a tight hole, scout reports indicate a possible major discovery at Texaco's Southwest Marsh Island prospect. The remote wildcat is about 10 miles south of the Vermilion Parish mainland.

It is one of three wildcats drilled recently on sprawling State Lease 340 acquired by The Texas Co. 22 years ago (OGJ, May 5, p. 72). The drilling program followed a favorable ruling by a Department of Interior solicitor, setting the seaward limit of the lease at 3 leagues from shore. Until then, the seaward boundary of the lease had been repeatedly contested.

The Texas Co. had "nothing to report" on any of the three wells. Offshore scouts for competing companies, on the other hand, have filed voluminous reports. Among the pertinent, though unconfirmed, data:

. . . **One Southwest Marsh Island** test was bottomed at 12,395 ft. Texaco reportedly tested one interval at 8,954-70 ft. and shut in the well. Texaco was said to have taken about 300 core samples. According to one source, the test "looks like a helluva good discovery." The rig was moved to another location about 7,500 ft. to the east.

. . . **Another South Marsh Island** test, about 8 miles east and slightly north of the Southwest prospect, was drilled to 12,866 ft. One test was made, at 8,506-16 ft. At last report, the rig was still on location.

. . . **A Rabbit Island** test, nearly 30 miles farther east but on the same long-disputed lease, was plugged as a dry hole at 14,698 ft.

PROCESSING BRIEFS...

Standard Oil Co. of California will start construction in October on a 32,000-bbl. refinery at Barber's Point near Honolulu, Hawaii. The plant is scheduled to be completed about the end of 1960.

Continental Oil Co. is installing an electronic data processing system to help maintain peak efficiency in a catalytic reformer at the company's Ponca City, Okla., refinery. It is the first system of its type to be installed in a Conoco refinery.

Dow Chemical Co. has started production of hydrochloric acid and vinyl chloride at its new chemical plant now nearing completion near Plaquemine, La. Other production units in the plant will go into operation within the next few weeks. Major construction work on the $65,000,000 plant is expected to be completed by early fall.

Carter Oil Co. has begun work on a new 2,300-bbl. alkylation unit at its 34,000-bbl. Billings, Mont., refinery. The new unit, scheduled for completion early next year, is part of the company's big refining and marketing expansion program. The expansion will include completion of 134 new service stations this year.

Chlorine and caustic soda will be produced at the Army's chemical plant facilities of the Pine Bluff, Ark., arsenal. The plant has been leased to Arkansas Louisiana Chemical Corp., a new company set up by Arkansas Louisiana Gas Co. The Pine Bluff plant will have a daily capacity of 75 tons of chlorine and 80 tons of caustic soda. The plant was operated from 1947 until last February by Diamond Alkli Corp. Arkansas Louisiana is expected to start production at the plant during the next 3 months.

The Eastman flame-cracking process for production of acetylene and ethylene from light hydrocarbons is to be available on a license basis in the United States. The commercial

Drilling Island Almost Ready

RICHFIELD OIL Corp. will spud the first well in September from its earth-filled island ½ mile offshore from Rincon, Calif.

The unique island is being built in 45-ft. water. Only about 1 acre of working space is provided at the surface, but the base extends over some 3 acres.

The seaward side (left in the photo) is built up about 41 ft. above water level for protection against wave action. The earth-filled portion is 16 ft. above sea level, except for the concreted reinforcing section just inside the huge pile of tetrapods.

Conductor pipe has been set for 68 wells, in two rows 5 ft. apart, on the western side of the working area. They will be drilled from a specially designed, four-legged mast. Two legs will rest on the raised portion, along which the rig will be skidded.

There apparently is little chance Richfield won't find the 1,175-acre, state-granted lease productive. Before starting construction on the island, it drilled six core holes from floating barges. One was drilled to 4,100 ft., and after pipe was set a 6-hour production test was made.

Richfield's original application to the Corps of Army Engineers calls for two islands on the lease. Construction of the second island must await results from the first. The second island may be built in 64-ft. water more than 1 mile from shore.

Alaskan Hole Abandoned

ALASKA'S DEEPEST hole, the Deep Creek Unit No. 1, was abandoned last week by Standard Oil Co. of California.

Total depth of the Kenai Peninsula wildcat was 14,221 ft. Standard had pulled back up the hole and redrilled a section to 12,253 ft. before deciding to abandon the test.

One other wildcat is now being drilled on the peninsula. Operator on it is Anchorage Gas & Oil Co.

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plants will be designed and constructed by Stone & Webster Engineering Corp., Boston, under a contract with Tennessee Eastman Co.

British American Oil Co., Ltd., has extended its western Canadian marketing territory to Yukon. Distribution will be handled by Yukon Shamrock Distributors of Whitehorse. Alaska Yukon Refiners will provide transportation and storage.

An extensive modernization program has been completed at the 20,000-bbl. Bakersfield refinery of Standard Oil Co. of California, Western Operations, Inc. Principal addition is a 5,000-bbl., two-stage catalytic reformer. Other refinery equipment was rearranged to prepare feed for the new reformer.

A new 26,000-bbl. catalytic reformer is on stream at Gulf Oil Corp.'s Port Arthur, Tex., plant. It is the second such unit in operation at the 275,000-bbl. refinery. The first, with capacity of 29,000 bbl., was completed in 1955. Both units are licensed by Universal Oil Products Co. Procon, Inc., was prime contractor.

Completion of the modernization program at the Tyler, Tex., refinery of La Gloria Oil & Gas Co. is expected by the end of the year. The program includes increasing the capacity of charge stock to step up output from the catalytic cracking unit between 20 and 25%. Also, propane and propylene recovery from the gas concentration unit will be increased from 55 to 92%.

Magnolia Petroleum Co.'s new 8,000-bbl. alkylation unit is now on stream at the company's 205,000-bbl. Beaumont, Tex., refinery. The new unit is the second of its kind at the refinery.

Also for Refiners . . .

IN THE NEWS: OCAW wins court fight to regain control of rebel Trenton local and push talks to end Aurora strike (p. 68) . . . The growth of downstream processing means higher operating costs and a more complex processing arrangement ahead for refiners (p. 74) . . . The '59 cars, with a little more horsepower and compression, will need more premium gasoline of better quality. But the pressure on refiners will be less than in the past (p. 76) . . . Requests for imports quotas by old importers and newcomers would kick shipments up by more than 600,000 bbl. daily (p. 78) . . . Carson has cited six importers for failure to comply with voluntary program—they face loss of government business (p. 82) . . . A 40,000-bbl. daily refinery is being planned on the Mediterranean Coast of Algeria, the country's first (p. 88).

PLUS THESE TECHNICAL REPORTS: Radioactive coke-level indicators increase delayed-coker capacity (p. 93) . . . Iraq refinery at Daura boasts new complete plant (p. 101) . . . Process Costimating (p. 123).

INVITATIONS are pocketed by Warner Lewis, right, as . . .

IPE Ambassador Heads for Europe

EUROPEAN oil dignitaries are next on the list to receive invitations to the 1959 International Petroleum Exposition.

Warner Lewis, chairman of Warner Lewis Co. division of FRAM Corp. and latest official IPE ambassador, left for Europe last week. He will deliver the invitations, provided by William B. Way, IPE general manager, (left in photo), in 16 countries.

The invitations will go to operations managers of all major oil companies with home offices in England or on the continent and to FRAM licensees and distributors.

The exposition is scheduled for May 14-23, 1959, in Tulsa.

Carson Cites Six Importers

SIX AMERICAN oil importers have been singled out for failure to comply with the voluntary import-control program and face loss of government business.

Capt. Matthew V. Carson, Jr., import-program administrator, has notified the Military Petroleum Supply Agency and the General Services Administration that the firms are not eligible to bid during July to supply products to the Government.

The companies reportedly exceeded their quotas under the voluntary program during the 3-month period of April, May, and June.

Carson's office named the companies as: Crown-Central Petroleum Corp., Baltimore; Delta Refining Co., Memphis; Eastern States Petroleum & Chemical Corp., Houston; Shell Oil Co., New York; Southwestern Oil & Refining Co., Corpus Christi, Tex.; and Texas Asphalt & Refining Co., Houston, Tex.

At present, Carson notifies GSA and MPSA "as a matter of course" about importers which are exceeding their quotas. This is a change in policy. The first plan was for MPSA and GSA to ask Carson only in cases where they had a question.

Companies bidding to supply products to MPSA are asked to state whether the product will be made from imported or domestic crude oil. If the product is to be made in whole or in part from imported crude, the companies are asked to state that they are in compliance at the time of the bid and that they will remain in compliance during the life of any supply contract.

MPSA officials said they are not worried about the time lag between actual imports and notification from Carson's office that a company is exceeding its quota. MPSA officials explain there is a time lag—usually 30 days—between opening of bids and the award of a contract. Thus, notification from Carson usually will come in advance of an award, even if not the time of a bid.

—— *Industry* briefs

A new Jersey Standard subsidiary, Esso Tankers, Inc., will begin operations in New York August 18. The company will give advice on tanker design and construction and charter service to other Jersey companies. It will also provide tanker fleet management, for two affiliates—Panama Transport Co. and Standard Tankers (Bahamas). J. M. B. Howard has been given leave of absence as Jersey's deputy coordinator of transportation to act as president of the new company.

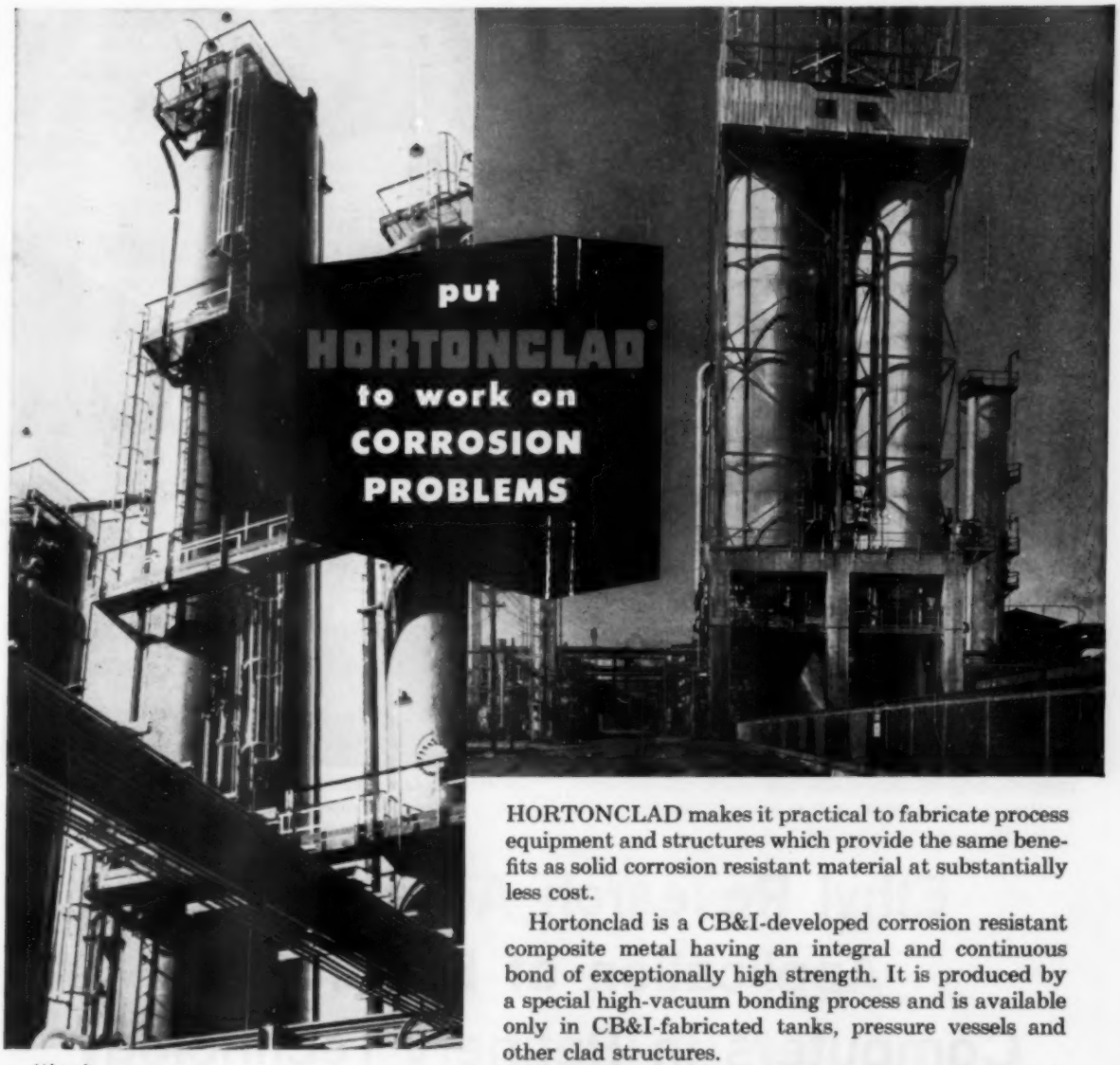
The Texas Co. has let contract for immediate construction of a 16-story office building adjoining the existing 13-story Texaco building in downtown Houston.

Drilling & Exploration Co., Inc., and others recently paid $270,000 for oil and gas properties owned by Avila Oil Co. in Oklahoma and Texas. The production includes Avila's oil interests in Centrahoma field of Coal County and North Sumner field of Noble County in Oklahoma and gas production in Collingsworth County, Texas. Drilexco estimates it has hiked its oil reserves by 300,000 net barrels through the purchase. Gas reserves acquired with the Texas property were not estimated since the gas property is only partially developed.

The 2-year-old Association of Oil-well Servicing Contractors has moved its national headquarters from Odessa to Dallas. Offices are located in the Davis Building, 1309 Main Street. James E. Danheim, recently named executive secretary, is in charge. Dallas is more centrally located and offers better transportation services for the more than 250 members from 15 chapters in 7 states. President of the fast-growing group is J. F. McAdams, Hobbs, N. M.

Sinclair Oil & Gas Co., Tulsa, has paid a reported $6 million for John W. Mecom's interest in 32 producing wells on 10 leases in the Hull-Merchant area of Liberty County, Texas.

Gross production from the wells is approximately 1,500 bbl. of oil daily. Net production is reportedly about 1,000 bbl. H. B. Smith, Sinclair's chairman of the board, announced the acquisition but did not disclose sales price nor amount of net production and revenues. The Hull field was discovered in 1912 and the Merchant field in 1952. Sinclair has considerable other leases and production in the immediate area. Mecom retained 11 other leases.



(Above)

ABSORBER TOWER at a Louisiana chemical company has stainless steel Hortonclad shell. Thickness of backing and cladding is 1¼ inches.

(Right above)

COKING CHAMBER at a Kansas refinery uses 405 stainless steel Hortonclad backed by A205 Grade A moly steel.

HORTONCLAD makes it practical to fabricate process equipment and structures which provide the same benefits as solid corrosion resistant material at substantially less cost.

Hortonclad is a CB&I-developed corrosion resistant composite metal having an integral and continuous bond of exceptionally high strength. It is produced by a special high-vacuum bonding process and is available only in CB&I-fabricated tanks, pressure vessels and other clad structures.

Silver, stainless steels (both chromium and nickel) nickel and alloys such as Monel, Inconel, Hastelloys B and F and a variety of other alloys may be employed in the Hortonclad process. Write our nearest office for a copy of the CB&I bulletin which describes:

. . . the benefits of HORTONCLAD

1. **Corrosion resistance**
2. **Economy of design**
3. **Uniform thickness of clad and backing plate**
4. **Integral and high strength bond**
5. **Wide selection of cladding materials**
6. **Clean contaminant-free surface**

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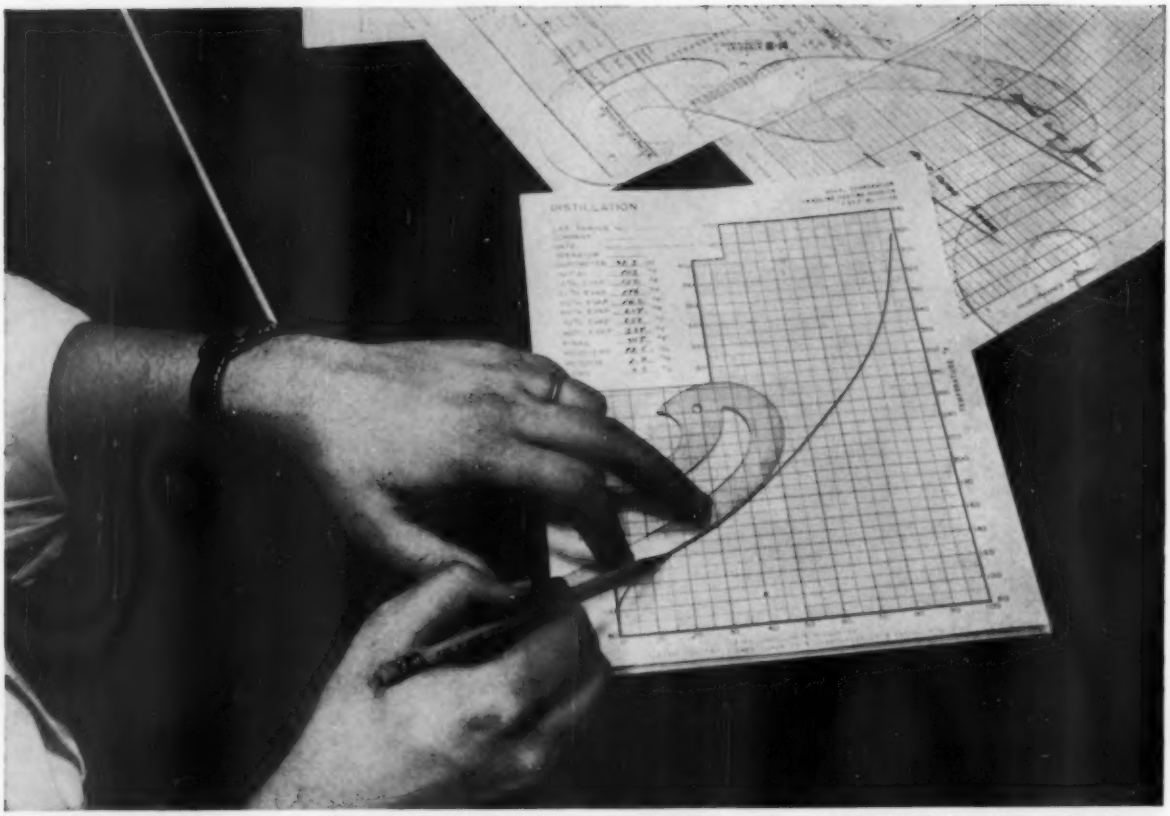


Distillation data and octane number data must be tabulated before machine calculations can be made to determine blending properties. Here, data are plotted for fuel blends in various combinations so that intermediate property points can be read.

Ethyl Research Advances the Application of Electronic Computers in Refinery Technology

By Dr. W. C. Healy, Jr.,
Supervisor of the Mathematical Analysis Section,
Refinery Technology Division, Ethyl Research Laboratories

DURING the past three years, the use of electronic digital computers has experienced tremendous growth within the refining industry.

Each new application in this field has been part of an over-all effort to develop the most practical mathematical approach and machine computing technique. Once this is accomplished, the solution of similar complex problems becomes more routine.

A New Section for Computer Study

Ethyl Corporation, the leading manufacturer of tetraethyllead, is vitally concerned with means of achieving most effective use of "Ethyl" antiknock compounds.

Studies of fuel composition, road performance, and octane improvement economics have for many years been a direct result of this philosophy.

Using past experience, the scope of studies by our Detroit Refinery Technology group has been broadened by the formation of a Mathematical Analysis Section to advance electronic computer application.

Field of Investigation

The major technical computer applications which have been studied to date are:

1. Computations of the properties of gasoline blends.
2. Analysis of road test data.
3. Processing of data from tetraethyllead and octane cost surveys.
4. Determination of best allocation of gasoline blending stocks and tetraethyllead.
5. Analysis of refining process operations related to tetraethyllead use; e.g., reforming.

An extensive computer effort has been the determination of best allocation of gasoline blending stocks and tetraethyllead (Item 4), a field of direct interest to those dealing with refinery operation.

Scope and Mathematical Approach

An example refinery running 50,000 barrels crude per day might market several finished grades of gasoline blended from perhaps twice as many refinery streams. A blending problem from this refining situation could consist of as many as 100 equations with perhaps twice as many unknowns.

In the past, this problem of optimizing an operation, while satisfying many restrictions, has been a difficult one and is necessarily limited by the magnitude of computing facilities. However, one form of optimization problem, known as linear programming, can be solved by repetitive simple arithmetic operations.

The basic process is known as the simplex method.

Large-scale, high-speed computing machinery has made linear programming an attractive means of arriving at the best solution of blending problems, even though linear approximations to some blending calculations are necessary.

A requirement of this method is the availability of constant blending values.

One approach to determine good blending values is to use the technique of least squares with component percentages as independent variables. For each property, e.g., Motor Octane Number @ 3.0 ml. TEL-gallon, an equation is determined by least squares as follows:

$$Y = X_1 B_1 + X_2 B_2 \ldots\ldots\ldots + X_n B_n$$

where:

Y = value of blend property
$X_1, X_2 \ldots X_n$ are component proportions by volume
$B_1, B_2 \ldots B_n$ are blending values being determined

Stepwise Solution of the Blending Problem

The usual first step in a computer blending study to optimize blending economics is to perform a series of laboratory blending tests. Such tests provide data for computation of blend properties and also verify computed properties.

These specifications or blend properties then can be expressed mathematically:

Reid Vapor Pressure

Volatility (specified by Distillation)

Research Octane Number

Motor Octane Number

Material Balance

Since the final objective is to achieve maximum dollar profit from the blending operation, economic features must be mathematically expressed as part of the total problem. A minimum list of economic factors ordinarily considered and incorporated in the study are:

Tetraethyllead

Alternate use values for components with more than one disposition

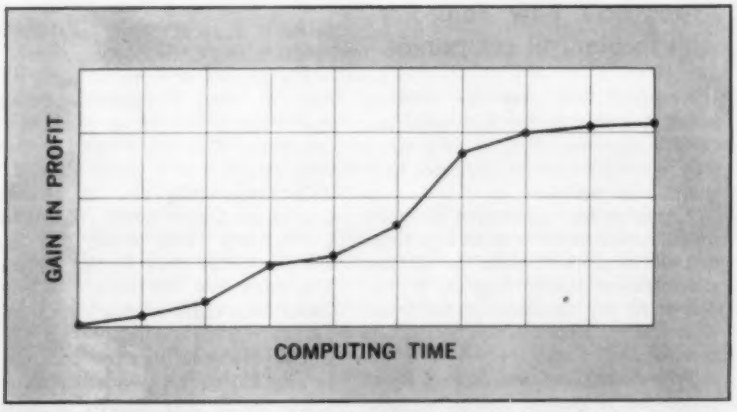
"Net Back" values on products which can vary in quantity.

After equations have been formulated, extensive tabulation is necessary to record equation coefficients on computer data sheets. Following this, all data are key punched on computer cards.

Proofreading is continuous, since a single incorrect sign or coefficient can throw off the whole computation.

Once data preparation and card punching are complete, cases of increasing profit to the refiner are generated on a large, high-speed computer. A study might entail generation of several hundred solutions.

Final solutions are analyzed and interpreted. A few of the better solutions are checked with actual laboratory blends. Following this, the end results are reviewed by process engineers for application to refinery blending.



Ordinarily computer time is used until further increase in profit is negligible. Shown above is a sample plot of gain in profit vs. computer time.

How Ethyl Research is helping you

The formation of a Mathematical Analysis Section in Ethyl's Refinery Technology Division is another step toward most effective use of "Ethyl" antiknock compounds by the oil industry.

This new group of specialists will be glad to share its experience in computation techniques with your people.

For further information, call your Ethyl Representative. He will be glad to arrange an appointment for you with one of our Refinery Technologists.

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Mexico Makes Headway

. . . with big processing, pipeline projects. But political situation still clouds future administraton of Pemex.

ANTONIO J. BERMUDEZ, genral manager of Petroleos Mexicanos, appears unconcerned about rumors that he may not be reappointed to his post by the new government which takes office December 1.

He's going ahead with a program to develop Mexico's oil resources at the same pace which has resulted in achievement unexcelled by any other government agency in the country.

Bermudez has the respect and support of large groups in business, political, and labor circles. But he also has some opposition.

The opposition stems from three sources:

. . . **Politicians** who aspire to the most remunerative job in government-administered agencies.

. . . **Labor unions** whose members are not as well paid as oil workers.

. . . **Transportation,** industrial, and consumer organizations opposed to Pemex's efforts to raise prices of petroleum products.

The price-raising efforts are designed to raise critically needed capital to expand development operations.

Only expresidents Ruiz Cortines, Cardenas, and Aleman, and President-elect Adolfo Lopez Mateos know who will administer the government's largest industrial operation. And like in most key political appointments, their choice is a well-guarded secret.

Big projects . . . Despite uncertainties, Pemex is going ahead with some important projects.

Among the most important is construction of a 600-mile, 24-in. gas line from Jose Colomo field in Tabasco to Mexico City. To finance this project, Bermudez has enlisted the cooperation of Altos Hornos, S. A., of Monterrey, Mexico's largest steel mill.

Altos Hornos is completing arrangements for a loan of about $40 million from U. S. banks to finance 120,000 tons of welded pipe required for the project. The pipe will then be sold on a long-time credit agreement to Pemex.

Other projects under construction include:

. . . **A catalytic cracking unit** at Atzcapotzaclo which will have capacity of 30,000 bbl. daily at 55% conversion. The feed preparation unit will have capacity of 55,000 bbl. daily of reduced crude.

Antonio Bermudez
. . . shows no concern about rumors.

. . . **Additional polymerization** facilities and a new HF alkylation unit in the same refinery.

. . . **Modernization** of the Ciudad Madero refinery by adding facilities costing $40 million.

. . . **A new lube oil plant** at the Minatitlan refinery with capacity of 800 bbl. daily of lube oil.

Brazilians Applaud

Argentina's new contracts with foreign oil companies.

ARGENTINA may be showing Brazil the way to try and solve her oil shortage and cling to "the oil is ours" slogan that both countries have guarded so jealously.

Argentina has announced contracts for oil development with foreign firms that she hopes will make the country self-sufficient (OGJ, Aug. 4, p. 70). The effect on her archrival for South American supremacy was immediate and electric.

Pres. Juscelino Kubitschek of Brazil called the Argentine contracts "fabulous." The Brazilian press trumpeted that Argentina was taking the lead in solving her economic problems. Proud Argentines chortled at the recognition.

U. S. Secretary of State John Foster Dulles had a 2-hour conference with President Kubitschek at Rio de Janeiro's Laranjeiras Palace last week. The meeting was designed for a discussion of Brazil's economic problems and how they could be smoothed in relation to the entire Western Hemisphere's development.

Those who sat in on the parley were mum on details, but oil, Brazil's biggest single weakness, was the prime topic.

Like Argentina, Brazil doggedly has clung to its own state-owned oil agency, Petrobras, and excluded private oil companies from the country's oil business. Like her sister Latin American country and neighbor, Brazil has bled herself white buying imported oil to keep an expanding industrial economy moving.

YPF Studies Bids

for big products line from Mendoza to Buenos Aires.

BIDS have been opened on a 653-mile, 10-in. products pipeline project from Lujan de Cuyo refinery in Mendoza Province to the Buenos Aires area.

Thirty-three offers were made to the Argentine Government, including four bids for the entire program covering pipeline and pumping station construction and electronic controls. The over-all project will cost about $25 million.

The complete bidders were a French industrial group, an Argentine-British-German-Austrian-American group including Phillips, a French fiirm, and Techint, a local bidder for Italian, Belgium, and German companies.

The project was one of three pipelines on which Yacimientos Petroliferos Fiscales sought a package bid last year. The other two contracts were awarded to a group headed by Fish Engineering Co. of Houston. One of the lines is under construction, a 930-mile, 12-in. crude line from Campo Duran area to San Lorenzo. The other line will be a 1,015-mile, 24-in. natural-gas system from Campo Duran to Buenos Aires.

The Mendoza pipeline program is in addition to the new series of contracts which may involve a foreign investment of more than $1 billion (OGJ, Aug. 4, p. 70).

West African Wildcat to Start

. . . on Ivory Coast. U. S. and French firms test big block in joint venture. Gulf spuds remote wildcat at Cabinda.

THE French Government has approved an agreement whereby Plymouth Oil Co. and Benedum-Trees Oil Co., Pittsburgh, will join a French firm to explore a 2,400,000-acre concession on the Ivory Coast of French West Africa.

The French company, Ste. Africaine des Petroles, holds a 51% interest in the concession and is operator. Plymouth has a 39% interest, and Benedum-Trees the other 10%.

Exploratory work has been under way for some time, since government approval of the agreement was a foregone conclusion. Terms of the agreement haven't been disclosed.

Preliminary work, in fact, has already been completed. And the general area of the first test has been chosen, although exact location isn't certain yet.

The first well, which will go to around 13,000 ft., will be drilled in the east-central portion of the Ivory Coast not far from the provincial capital and thriving seaport town of Abidjan.

Rig on the way . . . A heavy rotary rig is en route to the Ivory Coast from the United States. The rig, owned by Laughlin-Porter Drilling Co., of Midland, Tex., left Houston July 27 on the German freighter, Margaretha Bischoff.

The freighter is expected to arrive at Abidjan about August 17. Gary B. Laughlin, an executive of the contracting firm, left Fort Worth July 31 and was scheduled to reach the Ivory Coast August 4. He will coordinate operations until drilling is well under way.

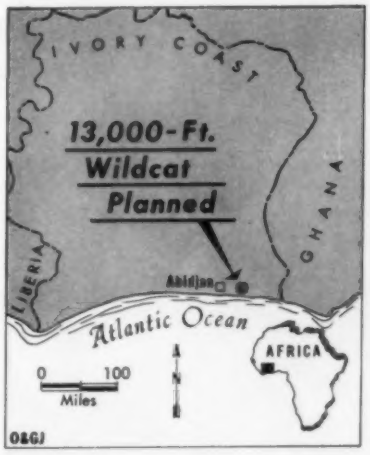
Actual drilling is expected to begin early in September.

Reliable reports have it that this first well is only one of several which will be drilled on the 3,700-sq.-mile concession. Other drilling sites, however, will not be staked until further seismic work now going on is completed and subsurface data obtained from the first wildcat.

The operating companies feel that prospects for developing production are good. Oil seeps exist in the eastern part of the concession. And shallow wells have been completed in the past in Ghana, east of Ivory Coast.

So far, concession boundaries have not been defined publicly.

The Ivory Coast venture will be the first for Plymouth outside the United States and Canada. The company, however, is currently negotiating for concessions in Guatemala.



Cabinda test starts . . . Farther down the coast of West Africa, Cabinda Gulf Oil Co. has spudded a wildcat near Fafes in the Portuguese enclave of Cabinda.

The district, a tiny finger of land wedged between French Equatorial Africa to the north and Belgian Congo to the south, is one of the few remaining untested territories along the west coast.

Gulf got the test under way a year after obtaining a license from Portugal. The company may be taking comfort in the fact that discoveries have been made both to the north and south. Its wildcat is in the same coastal basin in which the French brought in a promising well in the Middle Congo region of French Equatorial Africa.

The French well is at Pointe Indienne, about 60 miles northwest of the Gulf location. SPAEF tested a 90-ft. section at the rate of 50 to 105 bbl. per hour, using ¼ and ½-in. chokes. Pay was topped at 4,440 ft.

Total output along the West African coast is now about 19,000 bbl. daily. This includes about 4,000 bbl. daily from Angola fields, about 200 miles south of Cabinda. Output also includes 6,600 bbl. daily test production in Nigeria and 8,400 bbl. daily in Gabon.

New Group Studies Trans-Europe Line

NINETEEN companies have organized to study a pipeline project from the Mediterranean to the Rhine River and to seek the support of European governments for the proposal.

The new group, Ste. du Pipeline Sud-Europeen, is examining a proposed 30-in. line from Marseille to Strasburg, France, and to German cities in the Upper Rhine Valley.

The joint company could replace the SOPIMER group, which was formed to build a line from Marseille to Chalon-sur-Saone, with a feeder to Strasburg. The new group could join forces with the SAPPEUR project, formed 2 years ago to study a trans-European pipeline system extending from Marseille to Rotterdam.

Among the participants in Ste. du Pipeline are Deutsche Erdoel, Gelsenberg Benzin, Socony-Mobil, Scholven-Chemie, Wintershall, Antar Petroles de l'Atlantique, British Petroleum Co., Caltex, Cie. Francaise des Petroles, Cie. Francaise de Raffinage, Pechelbronn, Petrofina, Purfina Francaise, Royal Dutch-Shell, Francaise, S. A., and Standard Oil Co. (N.J.).

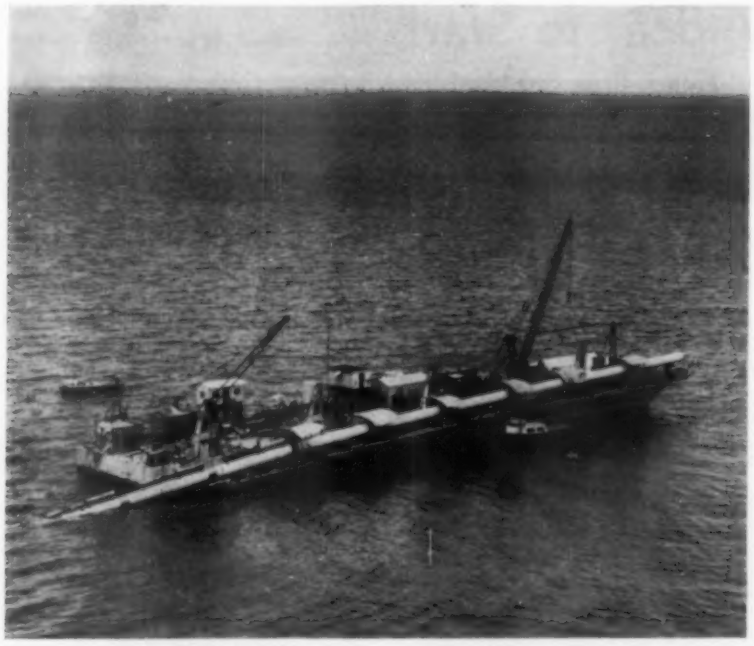
Refineries planned . . . At least three French refineries have been firmly planned on the basis of crude supplies brought in by pipeline from Marseille.

Omnium Francaise de Petroles will open a 60,000-bbl. daily plant near Chalon in 1961. A Royal Dutch-Shell subsidiary plans to open a 60,000-bbl. plant at Strasburg in 1962. Strasburg also will be the site for a 70,000 to 80,000-bbl. plant to be built by Cie. Francaise des Petroles and Pechelbronn (OGJ, Mar. 17, p. 102).

In Germany the line would feed such centers as Munich, Stuttgart, Wurtzburg, Frankfurt, and Mannheim. These cities lie considerably further inland from the Lower Rhine area, which will be serviced by pipelines from North Sea ports. Pipe is already being laid on a 230-mile, 28-in. line from Wilhelmshaven to the Ruhr. Preliminary work is under way on a 185-mile, 30-in. line from Rotterdam to the same area.

If the pipeline from Marseille is extended into Germany, the long-contemplated trans-European pipeline will be largely completed, except for the link between the Upper and Lower Rhine.

The original SAPPEUR project contemplated a system carrying up to 800,000 bbl. daily across Europe.



WORLD'S LARGEST gas line is lowered in Maracaibo where . . .

Creole Lays Super-Inch Pipe

CONSTRUCTION has started in Lake Maracaibo on the world's largest gas pipeline.

The super-big-inch pipe, 40 in. in diameter, is being laid in approximately 70 ft. of water as part of elaborate gathering system for Creole Petroleum Corp.

The heavy, concrete-coated pipe is being welded and lowered into the water from one of the largest pipe-laying barges ever built. The barge is the "M-211," owned by Brown & Root, Inc., Houston, contractor for the Lake Maracaibo job. The vessel was towed to Venezuela from Brown & Root's yard on the Houston Ship Channel last spring (OGJ, Mar. 31, p. 66).

The huge pipe is reinforced and weighted with a 6-in. coating of concrete. A 40-ft. joint weighs approximately 20 tons.

In adidtion to nearly 14 miles of the 40-in. pipe, the Creole gathering system will include several 16 and 30-in. lines. Installation of smaller-diameter pipe has been under way for several weeks.

The underwater lines will greatly expand Creole's repressuring system in Lake Maracaibo. They will connect lake wells to Creole's Tia Juana Conservation Plant No. 3.

The 40-in. pipe is believed to be the largest ever used in a high-pressure line such as Creole's.

WEIGHTED with a 6-in. concrete coating, one joint makes a truckload at one of the yards in Venezuela.

The big pipe-laying barge used on the job proved itself last year in laying a large line in the Gulf of Mexico for Tennessee Gas Transmission Co. The barge is equipped with five 40-ton-capacity davits, a 710-ft. pipe-lowering pontoon, and eight 8,000-lb. anchors.

Refinery Planned

on Algerian coast. Seven companies announce plans.

ALGERIA, already one of the worlds' hottest oil exploration areas, was getting set last week for its first refinery.

A group of seven oil companies, including Standard Oil Co. (N.J.), announced in Paris they plan to build a 40,000-bbl. refinery near Algiers "as soon as possible."

The refinery could supply Algeria's 30,000-bbl. daily petroleum demand and still have 10% of its output for export until the local market expands enough to absorb the entire plant production. It will be located in the Algiers region on the Mediterranean Coast, nearest the country's best oil market.

Near pipeline . . . The refinery location is slightly more than 100 miles from Bougie, the terminal for a 24-in. pipeline already under construction from Algeria's big Hassi Messaoud field to the coast.

It was presumed last week that the refinery's owners would build a spur pipeline linking the big-inch carrier to their refinery or would transship crude from the Bougie terminal in coastwise tankers.

One of the seven companies, Cie. Francaise des Petroles, has a half interest in both the Hassi Messaoud field and the pipeline.

In addition to Jersey Standard and CFP the participants in the refinery project are Beryl Algeria, Cie. Francaise de Raffinage, Mobil Oil Francaise, Soc. Francaise des Petroles BP, and Soc. Shell d'Algerie.

Israel May Buy Big Refinery

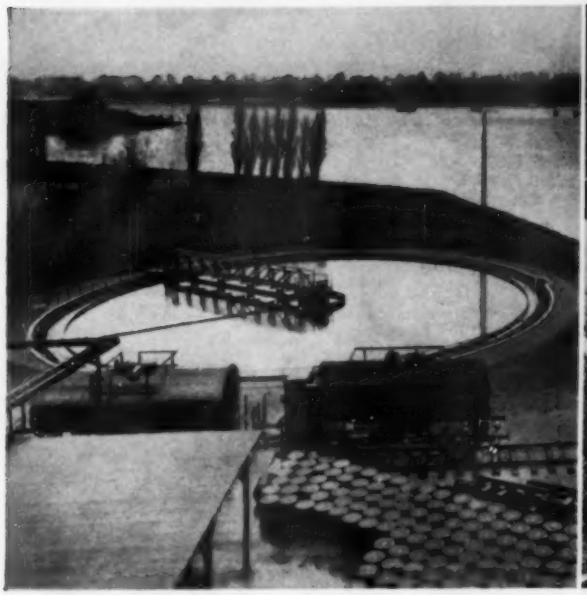
THE 85,000-bbl. Haifa refinery may be sold to Israel.

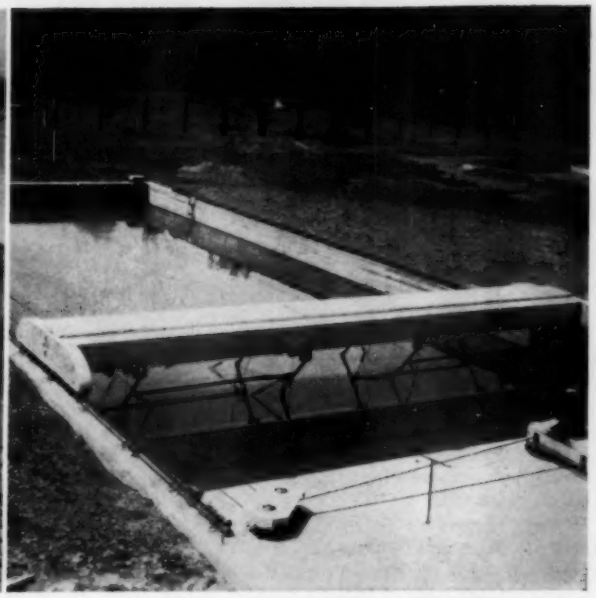
Israel's ministry of finance is looking into the possibility of buying the plant from Royal Dutch-Shell and British Petroleum Co. in hopes of raising throughput nearer to capacity. The refinery now processes about 24,000 bbl. daily.

Sale of the plant would mark the final withdrawal by major companies from Israeli operations. All marketing facilities have been sold, and the government owns a newly opened pipeline system feeding crude to Haifa from the port of Eilat.

The government is reported to be seeking foreign partners to put up money for the refinery, and to operate it.

round square rectangular





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• **POSITIVE OIL REMOVAL**—oil is positively and completely removed by skimmers after each revolution or cycle.

• **ECONOMICAL CONSTRUCTION**—choice of tank shapes enables you to use the most economical construction to fit your particular needs.

• **COMPLETE RANGE OF SIZES**—circular units are available from 20 ft. diam. Rectangular and square units in widths from 10 ft. to 110 ft.

• **LONG LIFE, MINIMUM MAINTENANCE**—simple, rugged mechanisms with accessibility of operating parts for ease of adjustment and minimum maintenance. All critical wearing parts are above water. No flights, chains, or sprockets.

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K. C. Thompson

Indiana Foreign Family United

ALL FOREIGN operations of Standard Oil Co. (Ind.) have been placed under one roof.

Cuban Stanolind Oil Co. and Pan Venezuelan Oil Co. are now subsidiaries of Pan American International Oil Co., New York. The two companies formerly operated as subsidiaries of Pan American Petroleum Corp., Tulsa, producing affiliate of Indiana Standard.

The new move means that Pan Am International is now responsible for all exploration, drilling, development, and production functions of Indiana Standard outside the North American continent.

Three key men, associated with Caribbean activities, have been transferred from Tulsa to the New York office of Pan Am International:

... G. J. Smith, manager of foreign exploration for Pan Am Petroleum, now exploration superintendent for the Western Hemisphere.

... K. C. Thompson, geophysical supervisor-foreign for Pan Am Petroleum, now chief geophysicist in the New York office.

... D. W. Farnham, operating superintendent-foreign in the Tulsa office, now operating superintendent in Pan Am International's production department.

The International subsidiary was formed earlier this year to run Indiana Standard's Eastern Hemisphere operations (OGJ, Feb. 10, p. 76). The company has exploration rights on about 23 million acres in Libya and about 4 million off Iran in the Persian Gulf.

The company recently signed contracts with the Argentine oil agency involving drilling and production operations in southern Argentina (OGJ, Aug. 4, p. 71).

Pan Venezuelan is exploring and developing 220,000 net acres acquired in Venezuela in 1957. And Cuban Stanolind is carrying out an exploratory program on 13 million acres on Cuba.

Iranian work starts . . . Pan Am has started a seismic survey on its high-priced Persian Gulf acreage.

The survey over the 6,177-sq.-mile area is expected to take 8 months. Drilling may start next May or June.

Pan Am got the acreage by offering National Iranian Oil Co. a 50-50 partnership deal, in addition to a 50-50 split with the Iranian Government. The company added a $25-million bonus for the government. It also agreed to spend $82 million on exploration in the first 12 years. NIOC will spend nothing (OGJ, May 5, p. 84).

The operations are being carried out by a nonprofit joint stock company, Iran-Pan American Oil Co.

Oasis Discovery Sparks New Wildcat in Libya

THE LIBYAN discovery of Oasis Oil Co. of Libya (Ohio) will be followed up soon by a second test on the same structure.

Oasis will drill the next well about 25 miles south and east of the Bahi 1 discovery, which came in at better than 30 bbl. per hour in the company's first try in Libya (OGJ, July 7, p. 85).

Bahi 1 last week was being completed after a series of tests at the rate of 500 bbl. daily. No stepouts in the immediate vicinity of the discovery are planned for the present. The rig used for the initial wildcat will be moved to the new location to the south.

Oasis is making its play in the 1,270,000-acre Block 32, which is conveniently near the Mediterranean. Bahi 1, near the center of the tract, is less than 75 miles due south of the Gulf of Sirte.

Oasis is the operator of a three-company group which has 62 million acres in the country. Continental Oil Co. and Amerada Petroleum Corp. are the partners.

The discovery is located on a north-south anticline, a prominent feature of the tract. The well initially tested 75 bbl. of crude on a 2½-hour drill-stem test of 32 ft. of pay topped at 5,822 ft.

Mobil test dry . . . Mobil Oil of Canada is abandoning its first test on Block 11 in Tripolitania. The Hofra 1 had a small show of oil but no commercial production. It was in the 8,500-ft. range.

The next test on the block will be drilled near the Mediterranean Coast due north of the Hofra test. The 4,700,000-acre concession borders the Oasis Block 32 to the south and east.

British Petroleum Co. also chose Tripolitania for its second well in Libya. Its subsidiary, D'Arcy Exploration Co., has spudded 1 Wadi Zachem at a site 30 miles south of Hon, and 180 miles south-southwest of Sirte. The well is on Block 63.

D'Arcy's first test was Castel Benito 1, 30 miles south of Tripoli. It was abandoned at 3,500 ft.

Fezzan tests . . . Esso Standard of Libya has abandoned a wildcat at Hashwa as a dry hole at 3,406 ft. The rig is being moved 22 miles east to a site at Geramna. The well will test the north end of a structure on which Gulf Oil Corp. drilled a dry hole.

Cie. Francaise des Petroles has a rig en route from a wildcat test at Hassi Iffertas to Concession 49 in Fezzan, 370 miles south.

Anglo-Saxon Petroleum Co. (Shell) last week spudded a well in a ceremony at Ein Azar in Block 52. The tract is bordered on the west by Algeria and on the south by Esso's Block 1.

BEAIRD-INGERSOLL-RAND Packaged Compressor Plant

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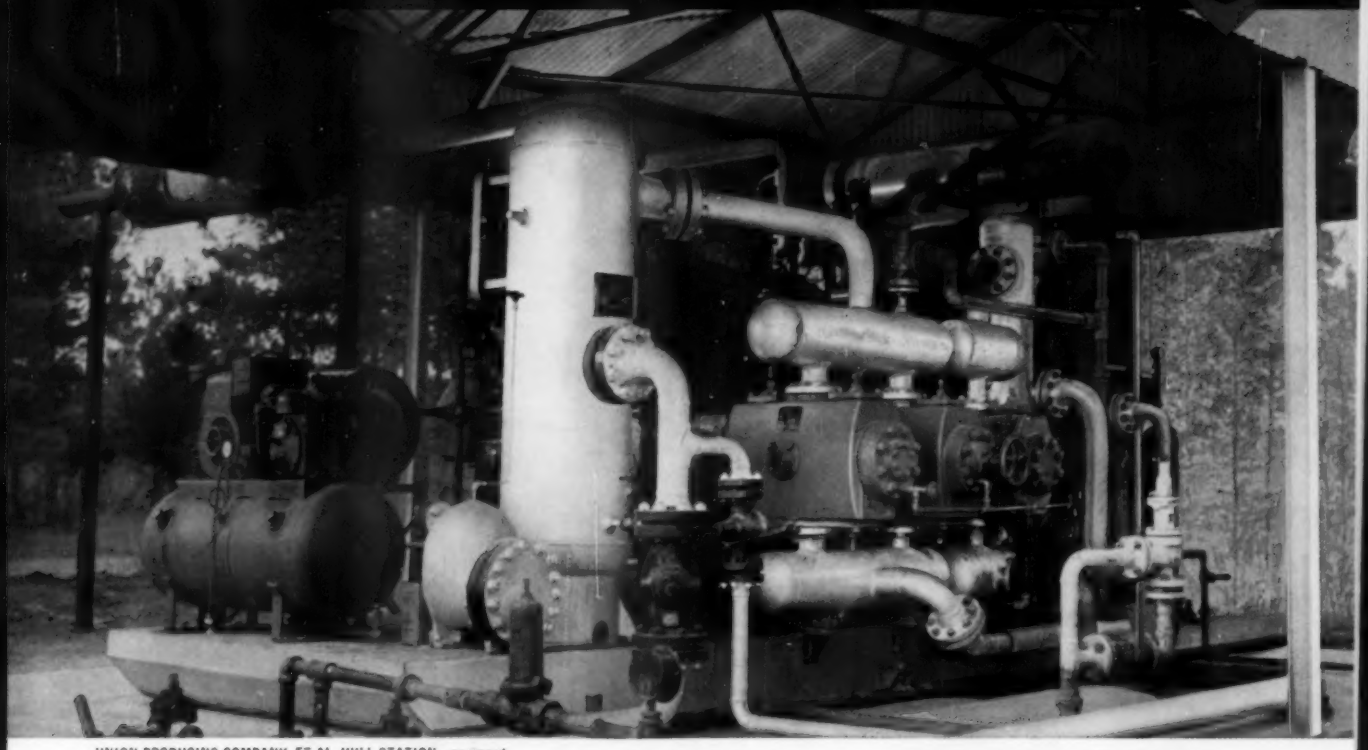

UNION PRODUCING COMPANY, ET AL. HULL STATION—equipped with a Beaird-Ingersoll-Rand 165 h.p. 6JVG Packaged Compressor. Unit has a Young Radiator with gas interstage, lubricating oil and engine cooling sections. Other Beaird compressors from 120 to 660 h.p.

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Radioactive coke-level indicators

Increase delayed-coker capacity

BY PAUL G. WRIGHT
Socony Mobil Oil Co., Inc.

TWO important operating changes have increased coker capacity and reduced carryover at the East St. Louis refinery of Socony Mobil Oil Co., Inc.:

- Temperatures of vapors leaving the coking drum were increased from 820° to 845° F. during the last few hours of operation before switching. Foam height was reduced from 20-25 ft. to 2-6 ft. and coke removal was not materially affected.
- Steam rate during the initial stripping process of a fuel coke drum was increased to prevent carryover. Since this change, no after-switch carryovers have occurred.

The solving of these problems increased general stream efficiency on the unit. Run lengths increased substantially. Shutdowns can now be scheduled. Additional capacity has been obtained as coke levels within 13 ft. of the top of the drum have been achieved. The radioactive coke-level indicators which were instrumental in solving the problems have paid off in more ways than just the prevention of overfilling a drum.

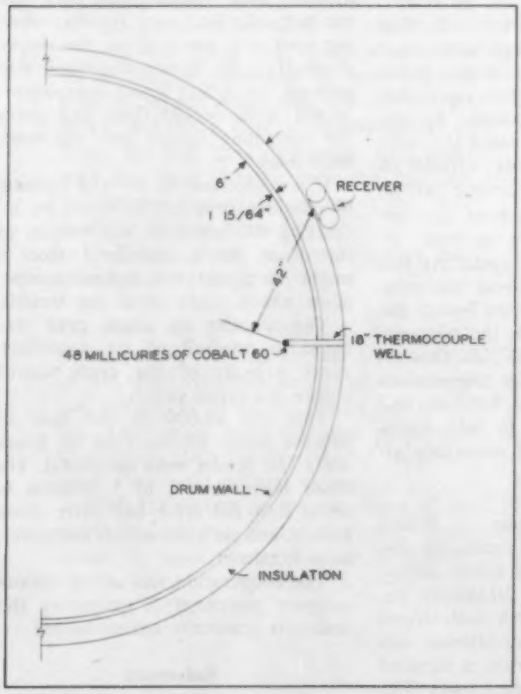
Process flow . . . The delayed-coking process flow is relatively simple. It has three major components: (1) distillation column; (2) furnace; and (3) coke drums. A heavy residual oil is charged to the distillation column where it combines with recycle oil returning from the coke drums. The residual oil and recycle are withdrawn from the bottom of the tower and heated in the furnace to above 900° F.

From the furnace the oil is charged to the bottom of one of the coke drums where it thermally cracks to coke, gas oil, gasoline, and gas. The coke deposition starts in the bottom of the drum with the level gradually rising during the on-stream period. The vapors return to the distillation column for fractionation. Every 24 hours a coke drum is taken off stream and the coke removed hydraulically.

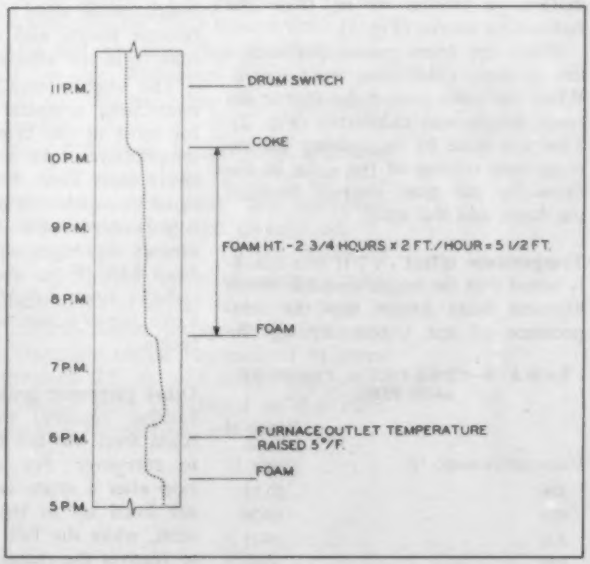
East St. Louis found early in the process that some method of determining the level of the coke in the drum was important. If residual oils which varied widely in coke content were processed it was easy to overfill the drums. This resulted in a heavy oil carryover into the vapor return line to the distillation column and into the furnace. The partially coked heat-sensitive carryover formed coke in the furnace tubes with resultant hot spots. A unit shutdown was always imminent.

Level indicators help . . . The radioactive coke-level indicators gave some insight into what was happening inside the drum. A reaction zone of heavy oil existed above the rising coke bed. The vapors traveling through the drum expand the oil reaction zone into a heavy foam. When the height of the foam was 20 ft. and the coke bed came within 20 ft. of the vapor-outlet line, carryover would occur.

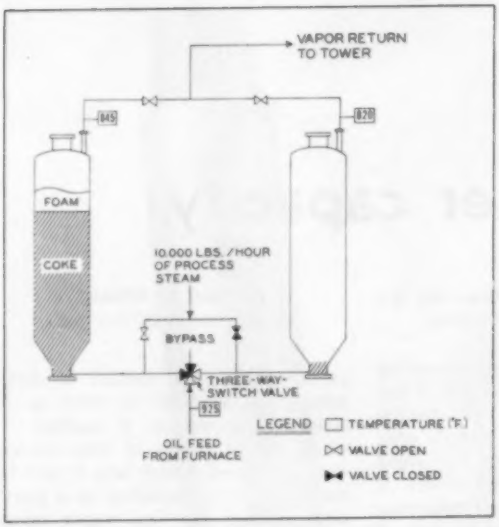
Increasing coker capacity meant the level of the coke bed must come as



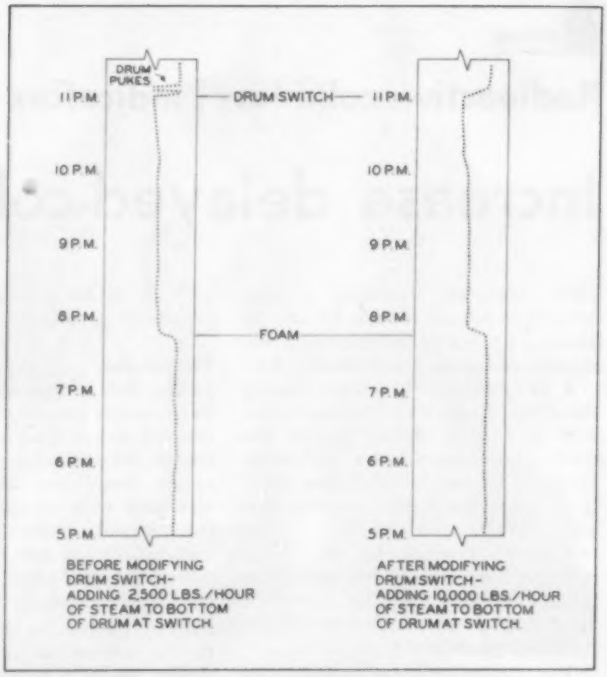
TYPICAL RADIOACTIVE coke-level indicator. Receiver is 42 in. from radioactive source. Fig. 1.



TYPICAL CHART for radioactive coke-level indicator at 17-ft. outage level. Fig. 2.



SIMPLIFIED lineup of coke drums immediately after drum-switching time. Fig. 3.



COKE-LEVEL INDICATORS showed that the foam was dropping back into the hot coke bed very rapidly, when the feed was switched to the empty drum. Fig. 4.

close as possible to the top of the drum. East St. Louis foam heights were 20 ft. This was a practical limit to prevent carryover. To increase capacity it became important to know what process variables would affect the foam.

The problem was studied as follows: The radioactive coke-level detection system developed in East St. Louis[1] features 48 millicuries of cobalt 60 in a thermowell in the sides of the coke drum. The receiver, manufactured by Ohmart Corp., Cincinnati, which monitors the gamma radiation, is located 42 in. from the radioactive source (Fig. 1).

When the foam passed the source the process conditions were noted. When the coke passed the source the foam height was calculated (Fig. 2). This was done by multiplying the average rate of rise of the coke in the drum by the time interval between the foam and the coke.

Temperature effect . . . It was quickly noted that the major variable which affected foam height was the temperature of the vapors leaving the drum. When this temperature was 820° F. at drum-switching time the foam would be approximately 20 ft. high. If this temperature was increased the foam height decreased. (See Table 1).

TABLE 1—COKE-DRUM PRESSURE 60-70 PSIG.

Vapor outlet temp., °F.:	Range of foam height, ft.
820	20-25
825	15-20
830	10-15
835	8-12
840	4-10
845	2- 6

The result of this study was that the furnace-outlet temperature was gradually increased to insure lower foam levels at the higher vapor-outlet temperatures. However, as the temperatures were increased the coke became harder and more difficult to remove in the allotted cutting period.

The solution was to hold the furnace-outlet temperature at 920° F. for most of the drum cycle. At this temperature, coke removal was relatively easy. Then, 5 hours before the drum is to be switched, the temperature is increased to 925° F. This increases the vapor outlet temperature from 835° F. to about 845° F. and reduces foam heights to safe levels. Coke removal was not materially affected.

Other carryover problems . . . It also became apparent that reducing the foam level was not the whole answer to carryover. For a 20-minute period after a drum switch both drums are lined up to the distillation column, while the full drum is steamed to recover the remaining vapors (Fig. 3). Sometimes, within a few minutes after the drum switch, the full drum would puke into the vapor outlet line. This happened when coke levels were 20 ft. or less from the top of the drum.

The coke-level indicators showed that the foam was dropping back into the hot coke bed very rapidly, when the feed was switched to the empty drum (Fig. 4). It was theorized that perhaps the lighter liquid components in the foam would flash and carry the remaining liquids into the overhead lines.

It was decided to try and cushion this sudden drop of the foam by increasing the steam to the bottom of the drum. As a secondary effect it might strip out the lighter components which could cause the trouble.

The amount of steam used was equal to one-half of the superficial vapor velocity of the drum vapors before the drum switch.

This was 10,000 lb. per hour of process steam on the East St. Louis unit. The results were successful. The foam now takes 3 to 5 minutes to settle into the coke bed after drum switch, and no after-switch carryovers have occurred.

The cooperation and aid of various refinery personnel in preparing this article is gratefully acknowledged.

Reference

1. Werstler, C. E., Niederstadt, R. J., and Lutz, H. A., "Inside a Coke Drum," The Oil and Gas Journal, August 9, 1954.

Gulf puts system into

Blowout-preventer testing

BY ED McGHEE
Drilling Editor

THE CHART that appears on the next two pages is Gulf Oil Corp.'s "Offshore Standard Test Procedure" for blowout-prevention and casing-head equipment. It represents one of the first positive steps anyone has taken to make certain that this vital equipment is tested properly and at the right times.

The chart was developed by V. D. Stone, drilling superintendent for Gulf's offshore zone at Morgan City, La. It is intended primarily for offshore work where pressures are sometimes extremely high and where a blowout can be more costly than on land wells. However, this systematic approach to an ever-present problem could well be copied by other companies offshore or onshore.

Gulf has used this standard test for more than a year and is well pleased with it. Many times the test has shown leaks and these were promptly repaired. Since the test has been used, well pressure has been thrown onto the blowout preventers several times but there was never a leak in these cases.

Gulf has found that the system has speeded up testing.

On every rig . . . Gulf has not asked rig personnel to remember the details of the chart. Instead, copies of the chart are placed at strategic places on every rig. They have been encased in plastic to remain readable in spite of weather, mud, time, and normal rig use.

With the charts on the rig, there is no doubt as to the exact way that Gulf wants its tests made. Failure to follow the chart's procedure is considered a breach of standing orders to be tolerated only in dire emergency.

The drilling contractor owning the rig is expected to furnish either test joints or test plugs with tapped pressure ports in each size test plug. Also, the contractor is expected to keep the necessary size test plugs on the rig in good condition.

Gulf requires that all preventers be given a complete shop overhaul at least once each year. Further, a complete set of ring gaskets and preventer-bonnet seal rings must be kept on the rig along with a good supply of preventer bolts.

How to make tests . . . The blowout-preventer hookup shown in the chart is standard with Gulf in its offshore work. Only slight changes would have to be made to adapt the procedure to the hookups used by other companies.

The test requires that 3,000 psi. be used on the 900-series preventers and 5,000 psi. be used on the 1500 series preventers.

Steps 1 through 12 are to be followed after each nipple up. This series tests every valve, connection, and preventer and also the casing and casinghead.

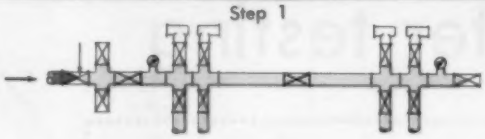
Steps "A," 8, and 11 are followed each 48 hours approximately during drilling. This is done while the pipe is off bottom inside casing. While it is not the complete check represented in steps 1 through 12, it will show any leaks that might have developed in the most vulnerable connections while drilling.

OFFSHORE STANDARD TEST PROCEDURE

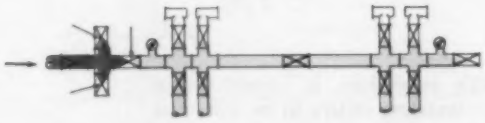
GENERAL INFORMATION:

1. Steps 1 through 12 are to be followed on each nipple-up.
2. Steps A, 8, and 11 are to be followed after approximately each 48-hour drilling period when making trip (pipe to be up in casing). More thorough testing will be at tool pusher's option.

Step 1



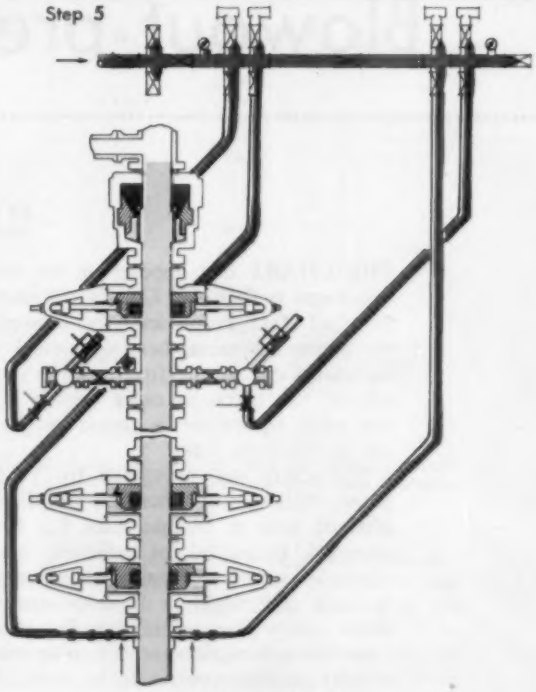
Step 2



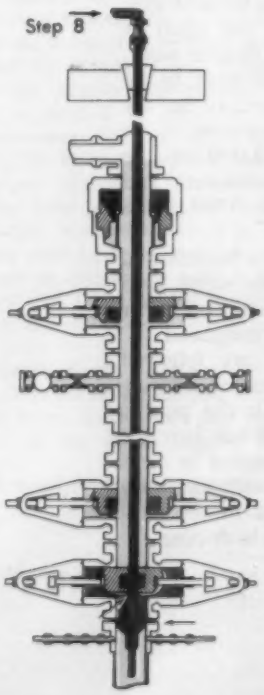
Step 3

Step 4

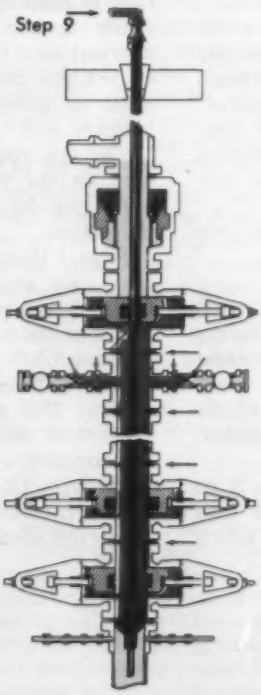
Step 5



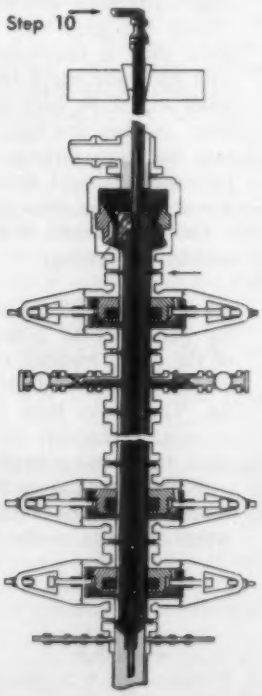
Step 8



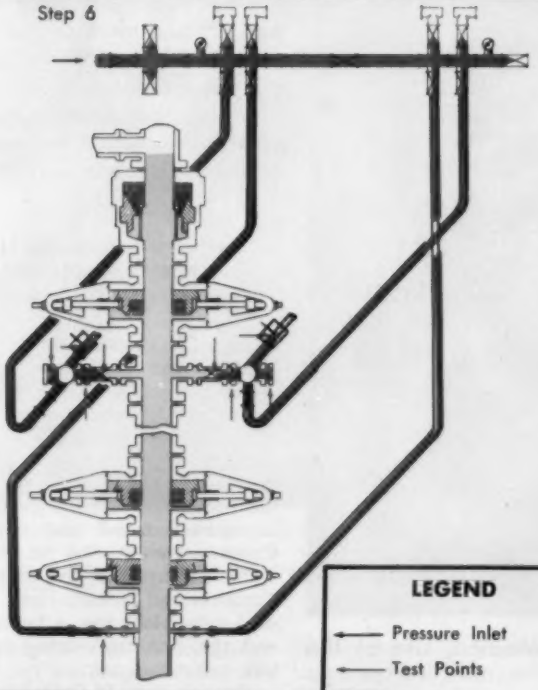
Step 9

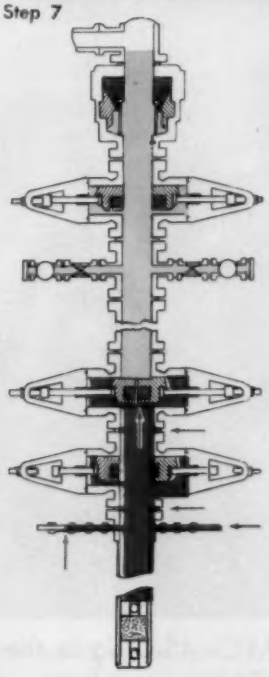


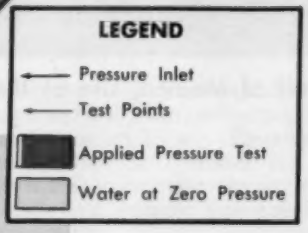
Step 10



3. Test Series 900 preventers to 3,000 psi. and Series 1500 to 5,000 psi.
4. Drilling contractor will provide either test joints or test plugs with tapped pressure ports in each size test plug.
5. Drilling contractor will provide test plugs in each size used. Necessary size will be kept on rig in good condition.
6. One complete extra set of ring gaskets and Cameron QRC bonnet seal rings will be kept on each rig. An adequate supply of extra blowout-preventer bolts will be kept on rig.
7. All blowout preventers will be given a complete shop overhaul not less than one time each year.







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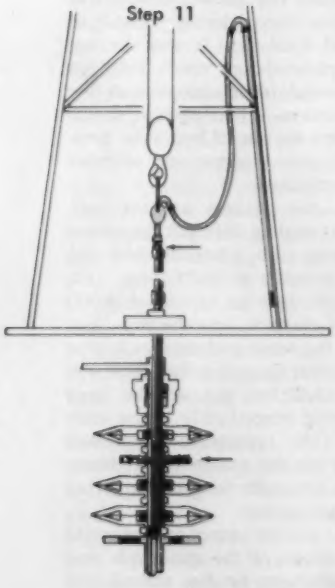
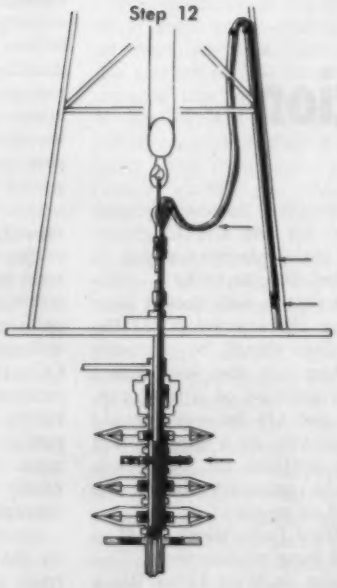
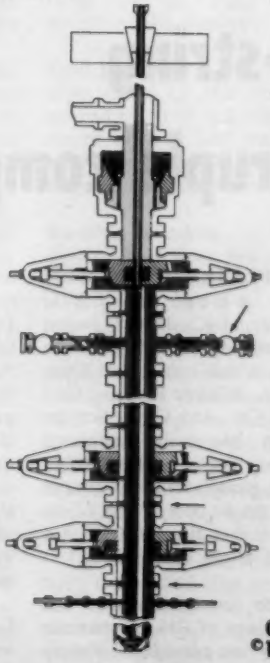






O&GJ ©1958

Here is CATC's 45-C rig in the Gulf of Mexico, site of the industry's first

Four-string quadruple completion

DUAL COMPLETIONS were fairly commonplace when the CATC group's Harvey, La., district began offshore operations in 1953. The CATC group, which consists of Continental Oil Co., Atlantic Refining Co., Tidewater Oil Co., and Cities Service Production Co., has dually completed 25 multiple-pay wells. On October 27, 1957, the group's Harvey district made its first triple completion of an oil well. Since that time, CATC has made 12 such triple completions.

Try quadruple completion . . . The use of four strings of 2⅜-in. extreme line tubing was first considered shortly after several triple-string completions had been installed successfully and economically for the CATC group. During the initial planning stages, it was concluded that, to make a quadruple completion, a well should have the following characteristics: (1) the producing zones should be relatively close together; (2) the four zones should show promise of a long producing life, and (3) the wells should show a possibility of a long-flowing life so that artificial lift or rework would not be necessary during the early productive stages.

CATC's West Delta Block 45 Well C-8 satisfied these requirements. This well is located in West Delta Block 30 field, approximately 12 miles off the coast of Louisiana in the Gulf of Mexico. The well was directionally drilled a distance of 1,326 ft. from the surface location from a self-contained drilling platform.

The authors say . . .

It is believed that the increased allowable gained by the successful quadruple completion will more than offset the additional costs of the well. The actual running operation was speeded up a great deal by spacing out the packers and marking the tubing prior to shipment to the location. It is felt that this is a very necessary step that must be taken in such a completion to avoid excessive rig time and confusion.

BY W. W. POIMBOEUF AND ROBERT HENDERSON
Continental Oil Co., Harvey, La.

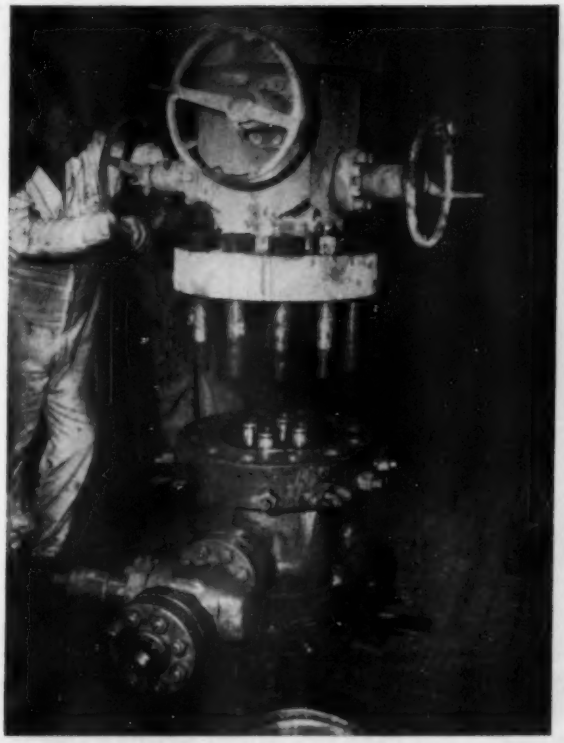
Wellhead . . . The christmas tree for this installation was designed, forged, constructed, tested, and shipped by Cameron Iron Works, Inc., Houston, within 23 days after this consultation. Cameron had manufactured the first dual-string block tree in January 1958 and the first triple-string fabricated tree earlier this year.

The tree was API Series 1500 with a 10-in. tubing-head flange. The tubing hanger was split in four 90° segments of a circle.

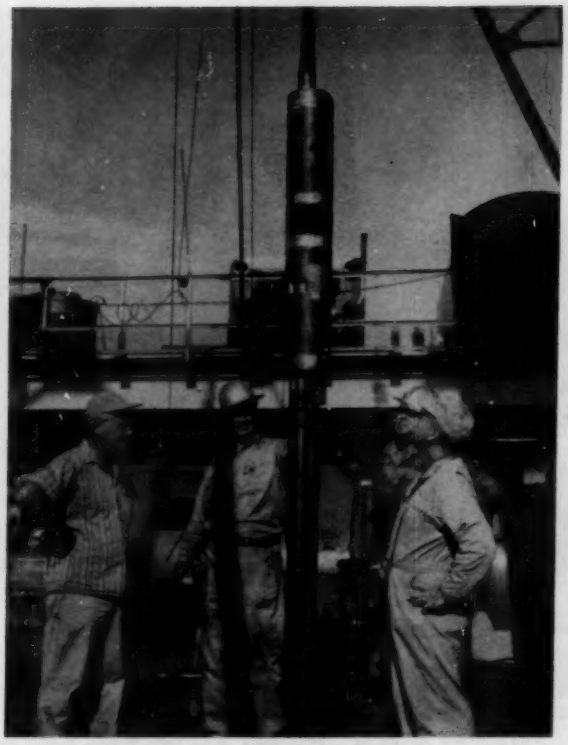
Packers . . . The packer design was already on the drawing board at Brown Oil Tool Co. It was the hydraulic-type set design which had been run in several triple completions for other operators. The packer design incorporates the use of hydraulic pressure to actuate a piston and cylinder setting mechanism.

Briefly, the packers are set individually by sealing off each respective tubing string with a bakelite ball and applying pressure to the tubing. Differential pressure in excess of 4,000 psi. shears the pins, sets the slips, and collapses the sealing element. A type CC (crisscross thread) safety joint was recommended for use on the long tubing string immediately below each packer. This recommendation was made due to the possibility of being unable to rotate the long tubing string through all packers.

Special unions were incorporated on the bottom of the quadruple and triple packers to tie the second and third connecting strings into the pack-



WELLHEAD of the first four-string quadruple completion in the history of the petroleum industry. Open ends of the four tubing strings are visible as the christmas tree is being lowered into place.



QUADRUPLE PACKER receives inspection as it is being lowered into the well on the No. 1 tubing string. Tubing for three lower zones is visible below packer.

ers. A pressure-actuated, collect-type stringer latch was designed specifically for this installation. This was necessary because of the possibility of pumping the second and/or third string connecting stinger out of the packers during setting operations.

The stingers for the second, third, and fourth strings for the quadruple packer were J-type latches. This equipment was run in the manufacturer's test well in Houston with operator's personnel present. The equipment performed satisfactorily.

While completion preparations were being conducted on Well C-8, the packers were assembled and spaced out in the warehouse yard. The tubing used in spacing out the packers was painted in a color code and shipped out to the rig. Thereby, a considerable amount of time was saved at the rig since it was not necessary to space out the packers while they were being run in the hole.

Completion operations . . . The well was plugged back to 9,820 ft. inside the 9⅝-in. casing. Since mud has a tendency to set up behind packers when it is exposed to high bottom-hole temperatures, it was decided to displace the mud system with a completition fluid that would not set up. All of the completion zones were new sands and their exact bottom-hole pressures were not known. Therefore, it was decided to drill-stem test the lower zone to determine the maximum bottom-hole pressure that would be encountered.

A 2-ft. section in the bottom of the lower zone was perforated with four jet shots per foot, and a drill-stem test was taken. The bottom-hole static pressure was found to be 5,755 psi. It was decided that a 12.2-lb. per gallon completion fluid would be adequate. This fluid would give approximately a 300 psi. overbalance at 9,500 ft.

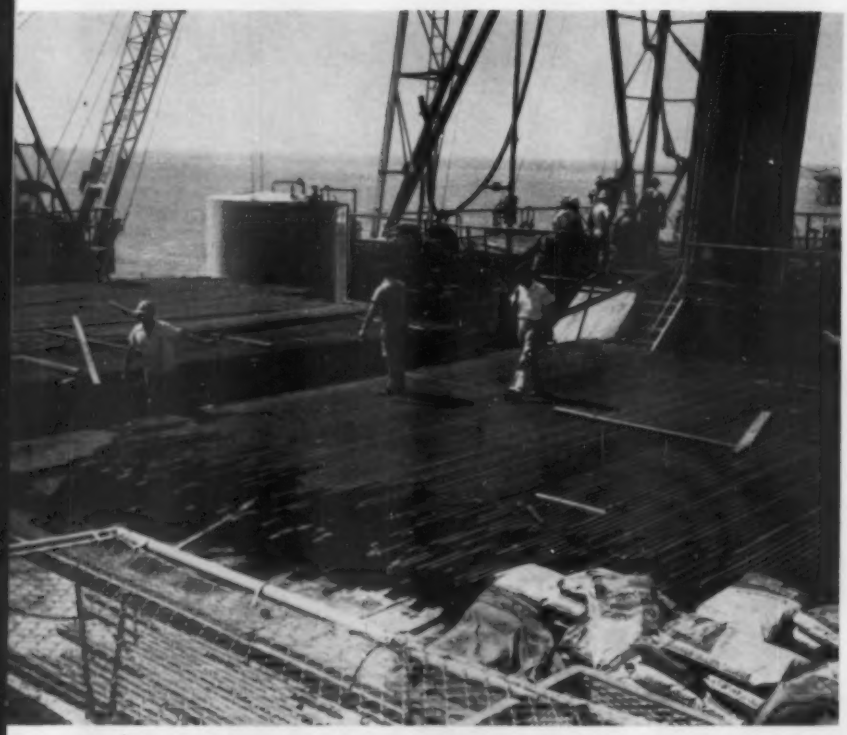
Cementing . . . To insure the primary job and to prevent water channeling from the numerous water-bearing sand stringers scattered throughout the interval that included the productive zones, each producing zone was block squeezed beginning with the bottom zone. A 2-ft. section was perforated in the vicinity of each producing zone and block squeeze was performed with 200 sacks of slow-set cement. The cement was drilled out and a dry test was taken on each set of squeeze perforations with the exception of the lower set, which was left plugged.

After dry tests had been obtained on all squeeze jobs, the mud system was displaced with fresh water. The water was weighted to 12.2 lb. per gallon with sodium nitrate and calcium chloride, using 1:2 ratio by weight of the respective materials.

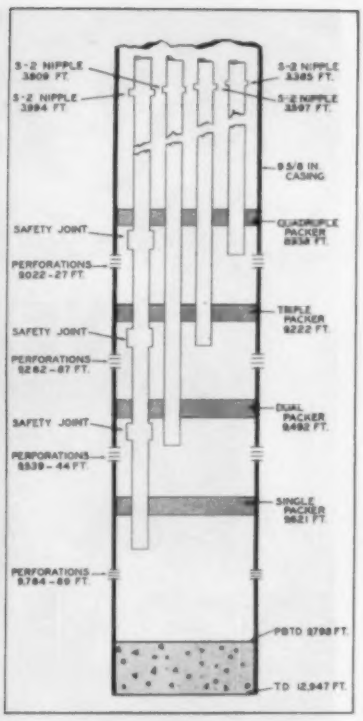
Sand problems . . . Trouble had been experienced in this field with sand incursion, so it was decided to perforate only a 5-ft. section of each producing zone and squeeze each zone with sand-consolidation plastic.

Running the tubing . . . The single and dual packers were run in the hole on the long string to the point where the triple packer was to be installed. The long string was hung in dual tubing slips and the second string connecting tubing was run and stabbed into the dual packer. The triple packer was then made up on the number one string and the number two string was tied to the packer with a union. This equipment was lowered on the number one string to a point where the quadruple packer was to be installed.

The number one string was again hung in the dual slips and the number two connecting string was run and stabbed into the proper port in the triple packer. The number one string was then hung in the elevators and



ALMOST 7 MILES of tubing was used in this four-string completion. Tubing used to space out the packers was laid out in the pipe yard and color coded prior to shipment to the platform. This saved time and prevented errors.



COMPLETION SKETCH of four-string quadruple completion, showing perforated intervals and setting depths of the four packers.

the number two string was clamped off on the drive bushings. The number three connecting string was then run and stabbed into the third port of the triple packer.

It should be noted that the proper port for these strings was designated by the stinger size, the second port being larger than the third. The quadruple packer was made up on the long string and the numbers two and three connecting strings were unioned to the packer. All this equipment was run in the hole to the predetermined depth on the number one string and landed in the tubing head.

A latch-type stinger was made up on the second string and run in the hole. Some difficulty was encountered in stabbing the stinger into the proper port in the quadruple packer, even though the second string port was larger than the third and fourth string ports. After failing to stab the stinger in the quadruple packer, the number two string was pulled. To avoid idle rig time while waiting on a new stinger for the second string, the third and fourth strings were run to 6,500 ft. and hung. The new stinger was then installed on the second string and it was run.

Due to excessive drag in the directional hole, it was necessary to add 2 ft. to the original pipe measurements to get enough weight to force the stinger into the packer. The third string was then run and stabbed into the quadruple packer without any difficulty. The number three string also had to be overspaced to get enough weight to stab into the quadruple packer. Attempts to stab the number four string in the quadruple packer were unsuccessful.

After working the number four string for a considerable amount of time, it was decided to pick up the blowout preventers and add a 2-ft. section to the number one string to take the suspected bow out of the number two and number three strings. After adding the 2-ft. section to the number one string, the number four string was stabbed without difficulty.

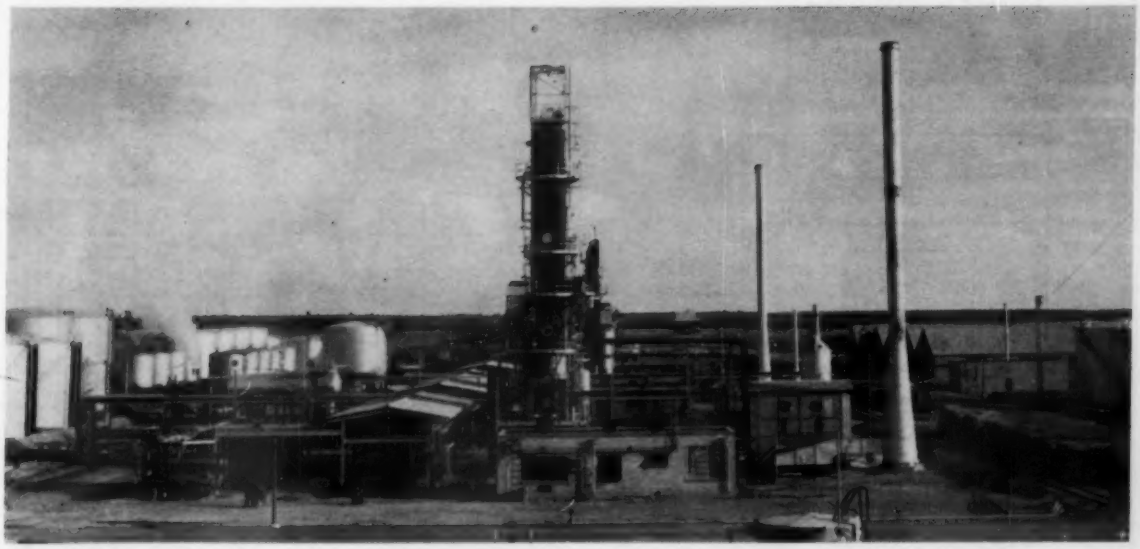
The christmas tree was then installed and reverse circulation was established through all four tubing strings to be sure there were no obstructions in the tubing. The packers were then set in reverse numerical order. A 1⅝-in. bakelite ball was pumped down the number four string to the seating point. The setting pressure was built up to 5,000 psi., and the casing was pressured up to 1,200 psi. to test the packer.

The setting ball was reversed out of the number four tubing string by pumping down the number three tubing string. The number three and number two packers were set in the same manner. The number three packer was tested by placing 1,000 psi. pressure on the number four tubing string, and the number two packer was tested by placing 1,000 psi. pressure on the number three tubing string. The number one packer was set by pumping a 1¾-in. ball down the number one tubing string and building up approximately 5,000 psi. setting pressure.

The number one packer was tested with 1,000 psi. by pumping down the number two string. The ball was flowed out of the number one string when the well was brought in. It should be noted that the ability to selectively circulate around the packers in the unset position proved to be a major gain in this installation.

The wells were swabbed in and tested, with the following results:

Zone	Perforations	Bbl./D	Flowing tbg. pres.	GOR	Grav.	B.s. and w (%)
C-8	9,784-89 ft.	300	1,750	317	27.8	.1
C18D	9,539-44 ft.	287	2,250	523	32.2	.1
C-8T	9,282-87 ft.	296	2,450	540	29.8	.1
C-8Q	9,022-27 ft.	241	2,400	528	29.0	.1



Daura, Iraq's largest refinery, boasts

World's newest complete lube plant

Kirkuk crude is charge stock for 455-bbl.-daily operation

BY MOHAMMED AL-NAQIB
AND J. W. MITCHELL
Iraq Government Oil-Refineries Administration

THE NEW lubricating-oil plant of the Daura refinery near Baghdad, Iraq, uses the most modern processes and equipment to produce up to 25,000 tons per year (455 bbl. per day) of all types of lubricating oils. Feed to the plant amounts to 118,300 metric tons per year (design basis), or 2,170 bbl. per day.

The plant includes these units, operating in sequence as shown in Fig. 1: vacuum-distillation unit, propane-deasphalting unit, furfural-treating unit, propane-dewaxing unit, acid-treating unit, clay-percolation unit, propane-preparation unit, and blending and compounding unit.

Finished lubricant products include motor oils SAE 10 through 60. These oils are heavy duty and regular, 95 v.i. Special oils include transformer oil, light turbine oil, heavy turbine oil, industrial white oil, agricultural oil, and base stocks.

Charge stock for the lube plant is the 40%-by-volume residue derived from stabilized full-range Kirkuk crude with these characteristics:

Specific gravity	0.953
Viscosity, S.s.U. @ 210° F.	108.
Pour point, °F.	75.
Conradson carbon residue, wt. %	8.9
Sulfur, wt. %	3.55

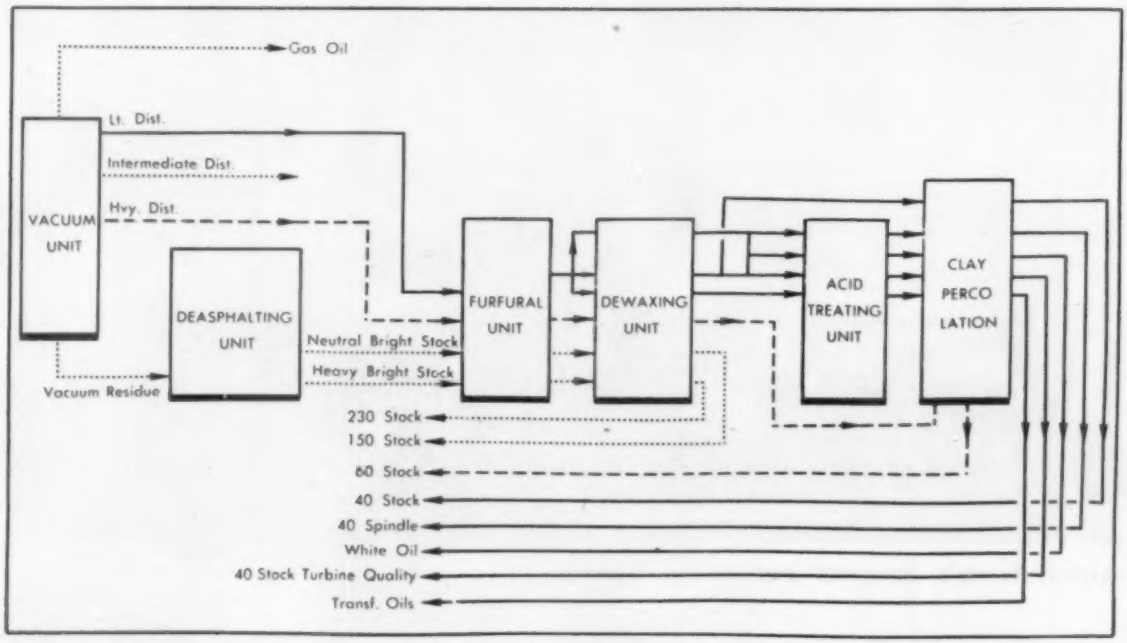
The Daura refinery is the largest of Iraq's four refineries. It is a 30,000-bbl. processing facility, making a complete line of products, with the exception of finished waxes and greases.

MOHAMMED ABDUL GHANI AL-NAQIB is director general, Government Oil-Refineries Administration, Baghdad, Iraq. He has held this post since 1955. Mr. Naqib entered Iraq Government service in 1936. He has served variously as inspector of oil measurement, assistant oil-measurement engineer, oil-measurement engineer, artesian well engineer, director of mines, director-general of economics, and director-general of oil affairs.

JEFFERSON W. MITCHELL is general manager of Daura and Qaiyarah refineries and general consultant to the director general, Government Oil-Refineries Administration, Baghdad, Iraq. He has been with this organization since 1954. Prior to that time, he served in various capacities with Pierce Oil Corp., Independent Oil & Gas Co., Phillips Petroleum Co., and NCRA. From 1945 to 1947 he was petroleum advisor to the Chinese Nationalist Government.

Vacuum-Distillation Unit

Charge to the vacuum unit consists of a 40% reduced crude from Iraq Kirkuk crude, received from crude-distillation equipment elsewhere in the refinery. This charge is heated through heat exchange and a fired vacuum heater to a maximum temperature of 698° F., and then flows to a vacuum fractionating column. This column operates at approximately 2 psia. and contains 26 conventional bubble-cap trays. By means of stripping steam and reflux the reduced crude charge is separated into the desired fractions. Vacuum on the tower is maintained



MODERN PROCESSING SEQUENCE at Daura lube plant allows production of full range of finished motor oils and base stocks. Fig. 1.

by means of steam jets and a barometric condenser.

The overhead-product gas oil is not processed into lubricating oil. A side stream is drawn off the column near the top and is passed to storage through coolers for further processing into a light-grade lubricating oil. Near the bottom of the tower another side stream is withdrawn and is pumped from the unit through coolers for further processing into an intermediate grade of lubricating oil. An intermediate side stream is withdrawn merely to make the desired specifications on the two mentioned above.

The bottom product, vacuum residue, is pumped from the bottom of the column through heat exchange and coolers to storage for further processing in the propane deasphalting unit.

The vacuum-distillation unit operates continuously producing the same stocks except for an occasional variation in the viscosity of the vacuum residue, to permit the production of a heavy bright stock needed in the blending of certain heavy finished oils.

Typical charge and product information for this unit operation are as shown in Table 1.

Propane-Deasphalting Unit

The purpose of the propane-deasphalting unit is to extract raw bright stock from the vacuum residue. The residue charge is pumped into a vertical tower where it is contacted with liquid propane. By means of suitable baffles and overflow troughs intimate contact is obtained between the charge oil and the liquid propane.

Approximately six volumes of liquid propane are used for each volume of charge oil in the treating tower, and by suitable adjustment of top and bottom-tower temperatures, the vacuum residue is separated into an overhead product for further processing into a finished bright stock (heavy lubricating-oil fraction) and a bottoms product consisting of a low-penetration asphalt.

The so-called deasphalted oil or raw bright-stock fraction, removed from the top of the tower in propane solution at approximately 500 psi. pressure is passed through suitable steam heaters and strippers where the propane is removed from the oil for recirculation within the unit. The propane-free deasphalted oil is pumped through coolers to storage for further processing.

The asphalt flows from the bottom of the treating tower through a fired heater and then into a flash tower and a stripper for removal of propane. This propane is recovered and recirculated within the unit. The asphalt is blended with a light oil, usually gas oil from the vacuum unit, to permit cooling the asphalt mix and pumping it from the unit.

Typical charge and product information for the propane deasphalting unit are shown in Table 2.

TABLE 1—CHARGE AND PRODUCT INFORMATION, VACUUM-DISTILLATION UNIT.

Charge—	Vol. % yield on whole crude	BPSD	
Reduced crude	40	2,325	
Product—			Viscosity S.s.U. @ 210° F. / SF @ 210° F.
Gas oil	7.6	442	
Lt. dist.	6.0	347	41
Int. dist.	2.0	116	48
Heavy dist.	7.2	420	65
Vac. residue	17.2	1,000	400
	40.0	2,325	

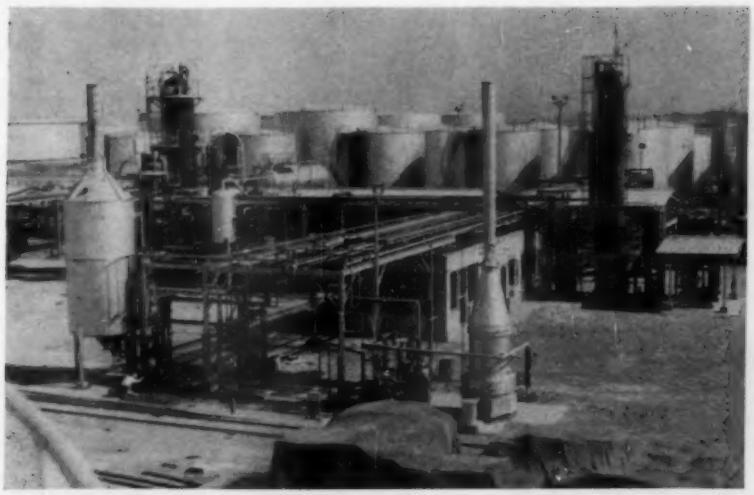
TABLE 2—CHARGE AND PRODUCT INFORMATION, PROPANE-DEASPHALTING UNIT

	Vol. % whole crude	BPSD	S.U.v. @ 210° F.	Penetration
Chg.	17.2	1,000	400 (SUF)	..
Yields				
Deasphalted oil	6.9	400	160	..
Asphalt	10.3	600	..	8

Furfural-Treating Unit

The furfural-treating unit is designed to process the side streams from the vacuum-distillation unit and the deasphalted oil from the propane-deasphalting unit. The purpose of the unit is to improve the viscosity index of the lube stocks and at the same time to reject undesirable material contained in the raw stocks and thereby greatly improve the oxidation stability of these oils.

Charge oil is pumped into the unit,



PROPANE-DEASPHALTING unit extracts raw bright stock from the vacuum-tower residue. Deasphalted oil is removed from the tower in propane solution.

heated to the desired temperature (150°-200° F.) and charged into the furfural-treating tower where it is intimately mixed with furfural by means of a rotary disk contactor.

The charge oil enters the tower near the bottom, and since it is lighter than the furfural which is injected near the top, it rises countercurrent to the descending furfural. This countercurrent contacting and extraction results in the undesirable portions of the oil being dissolved in the furfural and carried to the bottom of the tower.

The desirable portion, called raffinate, rises to the top of the tower as a separate phase. An interface between the raffinate and extract phases is maintained near the top of the tower.

The raffinate phase containing a small portion of furfural is pressured from the tower through a fired heater into the raffinate-recovery system where the furfural is removed from the oil for recirculation within the unit. The furfural-free raffinate product is pumped through coolers to storage for further processing.

Extract processing . . . The bulk of the furfural charged to the treating tower containing the extract product in solution is pressured from the bottom of the treating tower through heat exchange into a low-pressure flash tower where part of the furfural is vaporized from the extract. The bottoms from this tower containing the balance of the furfural is pumped through a fired heater into a high-pressure flash tower where the balance of the furfural is vaporized. The extract product flows by pressure from the bottom of this vessel into a stripper where final traces of furfural are removed by steam stripping under vacuum.

Since dry furfural is needed in this solvent-extract process, suitable fractionators, condensers, and accumulators are provided for the recovery of dry furfural and the rejection of water that enters the furfural stream during its recovery from the extract and raffinate products.

By varying the furfural-to-oil ratios and the temperatures in the treating tower, the various raw lubricating-oil stocks produced on the vacuum-distillation and propane-deasphalting units can be individually treated to give the desired quality of finished lubricating-oil base stocks.

Typical charge and production information for this unit operation are shown in Table 3.

Propane-Dewaxing Unit

The purpose of the propane-dewaxing unit is to remove the wax from the raffinates produced in the furfural-treating unit. The finished oils then have a low pour point and will flow readily to provide suitable lubrication at low temperatures.

Charge oil is pumped into the unit at a suitable temperature and mixed with propane in the desired ratio (propane-oil ratios from 1.7 to 3.2 are used). The propane-oil mixture is heated to approximately 180° F. to effect complete solution of the oil in the propane after which the mixture is cooled by heat exchange and water coolers to 90°-100° F. and charged to a warm-solution tank.

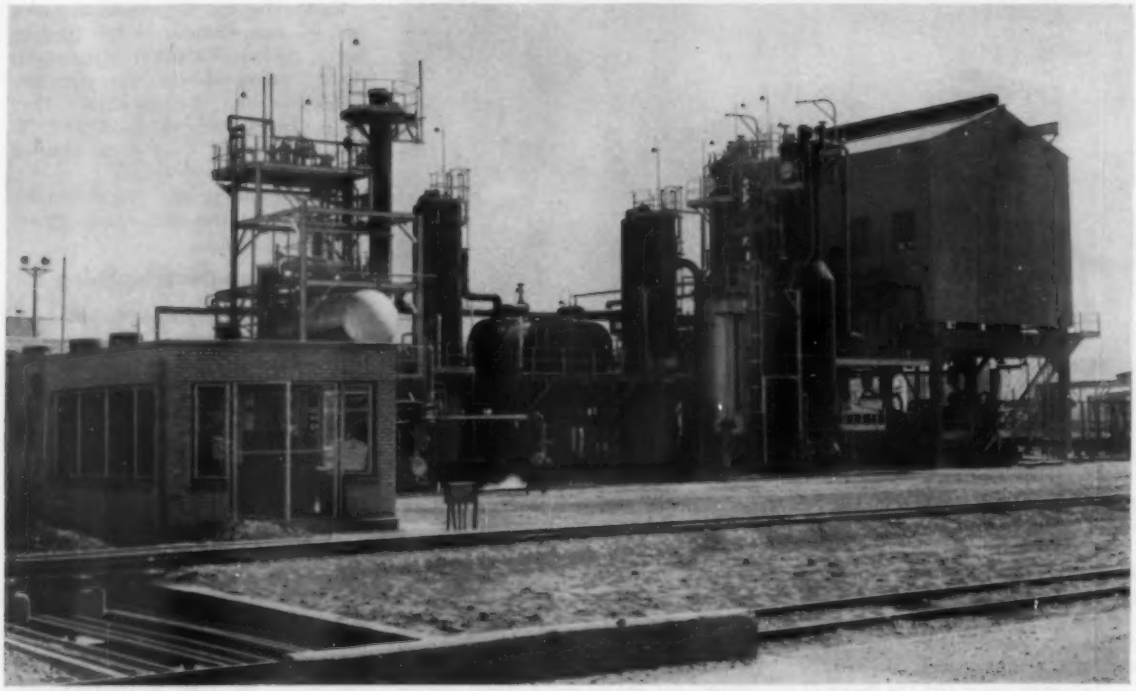
From this vessel the propane-oil

TABLE 3—CHARGE AND PRODUCT INFORMATION, FURFURAL-TREATING UNIT.

Charge				Raffinate yield			Extract yield	
					Per cent		Per cent	
Stk.	API	S.s.U. C210° F.	BPSD	v.i.	of chg.	BPSD	of chg.	BPSD
Lt. dist	24.9	41.0	1,250	95	77.0	965	23.0	285
Hvy. dist.	20.2	68.0	1,125	85	76.7	863	23.3	262
Hvy. dist.	20.2	68.0	790	95	70.0	552	30.0	238
NBS*	19.2	158.0	970	85	83.9	814	16.1	156
NBS*	19.2	158.0	575	95	68.0	390	32.0	185
HBS†	19.0	210.0	565	95	69.5	393	30.5	172

*Neutral bright stock †Heavy bright stock.

FURFURAL-TREATING unit improves the viscosity index of lube stocks and at the same time rejects materials which would impair oxidation stability.



PROPANE-DEWAXING unit removes wax so that the finished oils will have low pour points and will lubricate properly at low temperatures.

mixture is charged batchwise to each of two chillers where the mixture is autorefrigerated by means of two 200-hp. steam-driven compressors. These compressors chill the mixture by removing propane, thus reducing the pressure in each chiller, in turn causing the temperature to drop also.

Liquid propane is added to the chiller as needed to maintain a constant level in it as the refrigeration process proceeds until the final desired temperature of approximately −40° F. is obtained.

Under these conditions the wax in the oil is precipitated from the propane-oil solution where it remains in suspension. As one chiller is being refrigerated, the other is being charged with propane-oil mix so that it will be ready for the refrigeration process when the other chiller has reached the desired temperature. The chilling cycles require from 30 to 45 minutes depending upon the stock being charged to the unit.

Wax filters . . . When a chiller has reached the desired terminal temperature, it is emptied into a filter-feed tank from which it is pumped to rotary filters for separation of the precipitated wax. Two rotary filters are provided for the removal of wax from the propane-oil-wax mix. Each filter contains a cloth-covered drum enclosed in a steel shell.

The filter drum revolves through the cold waxy oil solution, and the wax cake is deposited on the filter cloth. The wax-free oil in solution in the propane passes through the cloth into the interior of the drum, and thence to a wax-free oil-solution accumulator.

Forcing of the solution through the filter cloth is accomplished by a pressure differential across the cloth, brought about by a means of a blow gas compressor. The discharge of this compressor blows the wax cake from the cloth, thus preparing the surface of the cloth for further filtration as it rotates back into the waxy solution inside the drum. The wax discharge from the filter cloth is mixed with liquid propane and pumped from the filter.

Propane recovery . . . The wax-free oil solution, still at approximately −40° F. is pumped through heat exchangers and steam heaters into a recovery system where the propane is flashed and stripped from the oil for recirculation within the unit. The wax-free oil is finally stripped with steam under vacuum and pumped through coolers to storage.

The cold wax-propane mix from the filters is pumped through heat exchange and suitable heaters and strippers which effectuate the recovery of the propane for recirculation within the unit. The final traces of propane are stripped from the wax with steam and the wax pumped to storage.

Temperatures of −40° F. are maintained in the filter feed tank, the filters, and the wax-free oil-solution tank by means of a holding compressor which keep the pressure on this system at the proper level to maintain the desired temperature.

Typical charge and product information are as shown in Table 4.

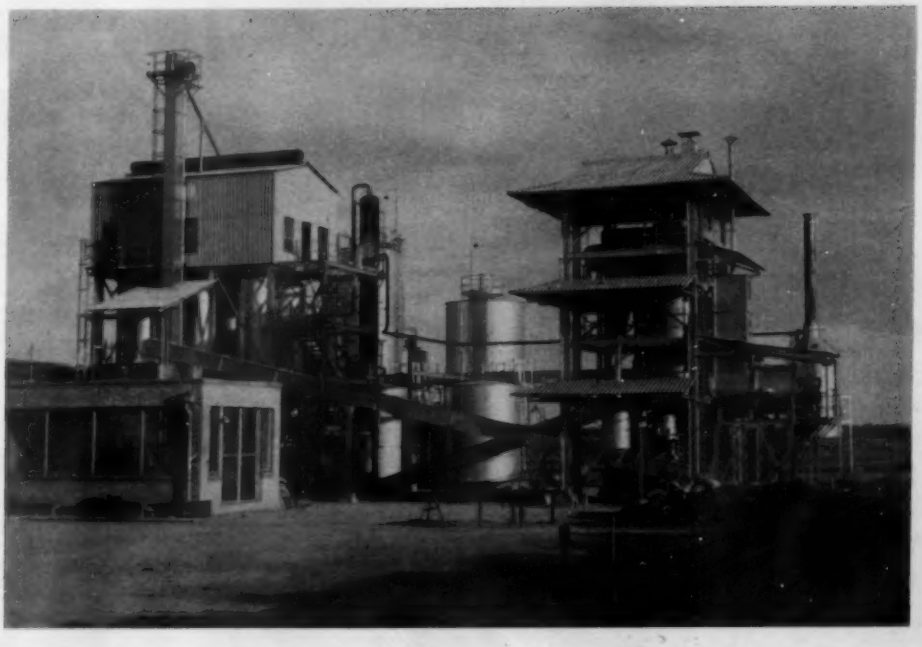
Clay-Percolation Unit

The purpose of the clay-percolation unit is to decolorize the oil as necessary to produce the proper-specification finished oils.

Dewaxed oil is pumped from

TABLE 4—CHARGE AND PRODUCT INFORMATION, PROPANE-DEWAXING UNIT.

	Charge				Dewaxed oil					Slack wax	
Stk.	v.i.	API	S.s.U. @ 210°	BPSD	API	Pour pt. F.	Per cent yield °F. on chg.		BPSD	API	BPSD
Lt. dist.	95	32.2	38.3	917	31.0	40.5	+10	31.7	750	37.7	167
Hy. dist.	85	28.5	55.0	855	26.7	63	+10	65.0	556	35.0	299
Hy. dist.	95	29.8	53.0	855	27.7	62	+10	62.0	530	33.5	325
NBS	85	23.5	127.0	676	21.5	152	+15	80.0	541	31.9	135
NBS	95	26.4	122.0	676	25.0	150	+15	74.0	500	30.6	176
NBS	95	25.5	162.0	612	23.8	200	+15	75.0	459	31.0	153



CLAY - TREATING unit decolorizes the finished oils to meet color specifications. Six filters are used, and three different oils can be percolated at the same time.

storage through a steam heater to obtain the proper charge-oil temperature and then pressured through a bed of activated clay. When the clay is spent, the charge is diverted to another filter and the oil drained from the spent clay bed.

Clay-treated oil is cooled and sent from the unit to finished oil storage where it is ready for transfer to the blending plant as needed.

Six filters are installed in this unit each holding 28,000 lb. of activated clay. Three different oils can be clay-percolated at the same time.

Clay reactivation . . . After a spent clay filter is drained of oil, residual oils retained on the clay are washed off with naphtha, the filter is steamed and the clay is dumped into a spent clay hopper. From the spent clay hopper, the clay is charged to a rotary clay burner where the clay is reactivated under controlled temperatures for reuse.

A fired heater, a stripping tower, condensers and suitable tankage is provided so that the naphtha used in washing the filters can be reclaimed and reused.

Propane-Recovery Unit

The propane-recovery unit is primarily designed to recover high-purity propane-propylene from the stabilizer off gas at the combination unit sufficient to supply the needs of the dewaxing and deasphaltizing units.

The stabilizer gas which otherwise would be burned as fuel in the combination unit furnaces is sent to the propane unit at 140-150 psig. It is metered and cooled to about 90° F. The cooling condenses liquid feed to the stripper column which is steam-reboiled to remove ethane and lighter materials. The stripper bottoms are pumped to the steam-reboiled depropanizer. The propane product is taken overhead with byproduct butane removed from the bottom of the column.

Propane product is 98%-pure propane-propylene and contains less than 1% ethane-and-lighter and approximately 1% of butane-and-heavier material. It is caustic-washed to remove hydrogen sulfide and is sent to the propane storage tanks at the lube-oil plant.

The normal yield of propane is approximately 40 bbl. per day.

Intermediate Tankage

Tankage is provided to store the charges and yields from each of the operating units, so that the units may be used in blocked out operation. The tanks are of sufficient number and capacity to give adequate surge to take care of normally encountered variations in charge and yield rates.

In addition, tanks are available for the blending of surplus stocks and byproducts, such as extracts, slack waxes, and gas oil.

Steam coils are provided in all tanks except those for the lightest wax-free oils, so that the stocks contained in them can be maintained at a high-enough temperature to permit handling them through pumps and lines. Lines containing viscous or waxy oils are steam-traced and insulated.

Total tankage for intermediate stocks, byproducts and finished oils amounts to 164,000 bbl.

Compounding

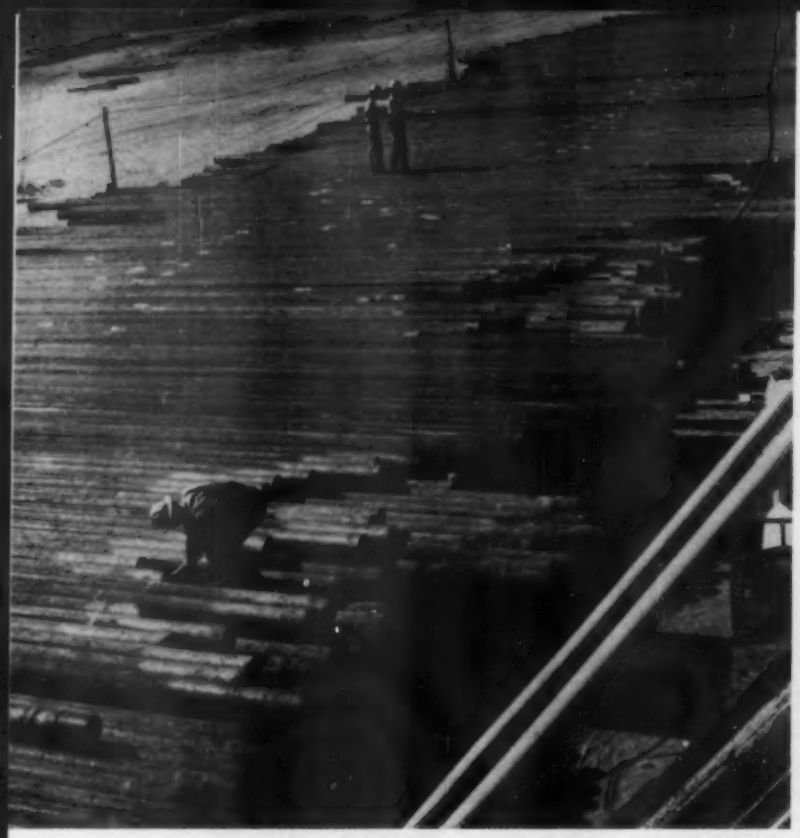
The purpose of the blending and filling plant is to blend the finished lube base stocks and purchased additives into the various types and grades of oils consumed in Iraq and to fill these blended oils into 40, 5, 1, and ¼ gal. (Imperial) containers.

Blending tanks, equipped with mixers and steam coils, vary in size from 100 to 5,000 bbl. in capacity. Facilities are provided for injecting additives into the various blends as required to make specification lubricants. Tankage is provided for storage of finished blended oils, ahead of the filling facilities.

Finished blended oils from any of the blending tanks or blended-oil storage tanks can be pumped to the filling area where the products are packaged for shipment. All filling is done on weigh fillers. Suitable conveyors are provided for handling both empty and filled containers and fork trucks are used for the storage and loading of packaged oils.

Storage has been provided for both filled and empty containers so that the blending and filling operations can be carried on in an efficient manner to meet offtake requirements. Packaged oils are shipped out in both trucks and rail cars.

Filling equipment capacity is as follows: 40-gal. barrels, 460 per day; 5-gal. drums, 490 per day; 1-gal. cans, 1,700 per day; and ¼-gal. cans, 7,810 per day, (all Imperial).



AT LEFT—Part of the more than 4 miles of pipe run in Phillips 1 EE University.

BELOW—Great Western's Rig 44 on the 1A Montgomery well.

Phillips makes it look easy

Long casing strings are routine

Setting 22,919 ft. of pipe in the 1 EE University and 23,000 ft. in the 1A Montgomery in a little more than 1 month, Phillips has set records on top of records! Deep as they are, these are not production strings (yet) as drilling continues in one, and will be resumed in the other. New records will be written every day, as Pecos County, Texas, becomes the world's basement.

BY ED McGHEE
Drilling Editor

ON JUNE 11 of this year, Phillips Petroleum Co. ran and cemented 22,919-ft. casing string in its 1 EE University well in Pecos County, Texas. Approximately 37 days later, 16 miles southwest and 81 ft. deeper, the company ran a similar string in the 1A Montgomery.

Both these strings are:

... **Longer by more** than 3,100 ft. than any other single string ever run.

... **Deeper by more** than 1,100 ft. than any other pipe ever set.

Impressive as these facts are, they don't tell all the story. For, Phillips was faced with these difficulties:

- Almost 12,000 ft. of hole was open at the time in the 1 EE University.
- More than 7,000 ft. of hole was open below 15,000 ft. in the 1A Montgomery.
- The 1 EE University had been whipstocked below 19,000 ft. and a 9° section of hole below 20,000 ft. caused as much as 40,000-lb. drag on the drill stem.
- More than 60 hours elapsed in both cases after the final bit was pulled till the top cement plug hit bottom.
- Air weight of each string was more than 700,000 lb.

To overcome these and other complications, Phillips took every possible precaution to insure success of the jobs. And, the strings were run and cemented without incident.

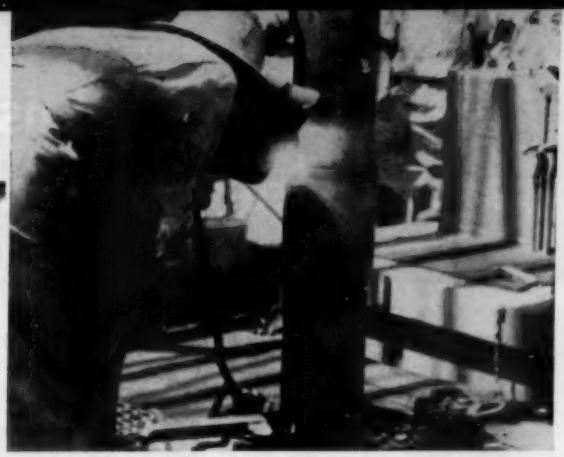
Wells logged . . . Before running casing, both wells were logged to bottom. The 1 EE University was logged by Schlumberger Well Surveying Corp.'s electric log, MicroLog-caliper, gamma ray-neutron, and continuous dipmeter. The 1A Montgomery was logged by MicroLog, caliper, and dipmeter surveys as well as the electric log.

These logs were a part of continuous logging programs which included running all these logs at intermediate depths during the drilling of the wells.

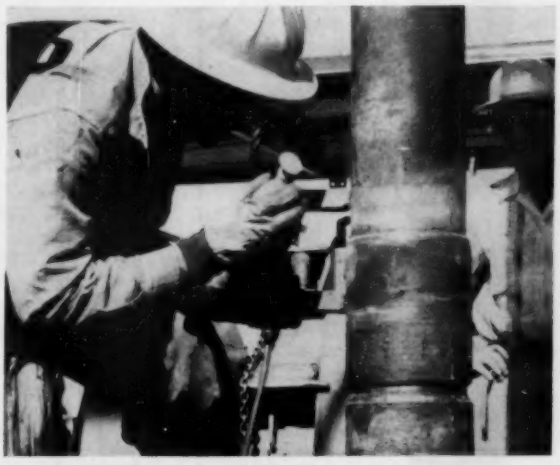
Maximum temperature measured in the 1 EE University was 318°. However, logging in the 1A Montgomery uncovered a real hot spot; maximum temperature recorded after 17½ hours in the hole was a sizzling 363°. In spite of this, the logs were technically satisfactory in both cases.

Because of the great length of time required to log such deep holes, two complete crews were on hand and Schlumberger's division mechanical supervisors stood by for possible emergencies. A standard field unit equipped with a torque-converter drive was used. The unit carried approximately 26,000 ft. of steel-armored, six-conductor logging cable of 15/32-in. diameter.

PREHEATING is necessary before welding P-110 pipe, to protect against underbead cracking.



PIPE JOINT is welded by skilled welder as company metallurgist observes operation.



METALLURGIST inspects the weld magnetically and allows it to air cool before joint is run into the hole.

Aiming deeper . . . The record strings are made up of 7⅝-in. pipe in the top section and 7-in. in the bottom section. For the 1 EE University, the string is merely protective pipe. Target for the well is the Ellenburger formation which is expected at 24,400 ft. (Drilling depth was 24,282 ft. as this article went to press.)

The 1A Montgomery was already in the Ellenburger at 23,000 ft. Drilling should continue to at least 23,400 ft.

Phillips considered running liners instead of full strings. Liners would require less time to run and be cheaper. However, there were other considerations. In the 1 EE University, there was a question as to whether the 9⅝-in. pipe already in place would support the weight of a liner; there had been much drilling and some fishing through the 9⅝-in. As a result, the liner idea was discarded in favor of running a complete string from the surface to total depth.

In the 1A Montgomery, the 9⅝-in. was relatively new and was itself a record-breaking string. This 9⅝-in. was the longest (at 15,868 ft.) string of pipe this size ever run and was likely the heaviest (at 758,992 lb.) string of any size pipe ever run (OGJ, April 28, 1958, p. 91). This 9⅝-in. could have supported a liner but a full string was more attractive. The well was already in the Ellenburger and could be completed in open hole below the 7-in. And, any uphole testing could be done inside the smaller-diameter string. And, if necessary, the 7-in. and 7⅝-in. inside this 9⅝-in. string could be pulled and salvaged.

Strings containing only 7-in. pipe would have been cheaper than strings with 7⅝-in. in the upper section. The 7⅝-in. was run because it helps drilling-fluid hydraulics during the drilling to come later. A larger-size drill pipe can be run in the 7⅝-in. casing than in the 7-in. And, hydraulics below 23,000 ft. are bad enough without using smaller drill pipe unnecessarily.

Full 7⅝-in. strings were not possible because of the lack of clearance in the open hole.

With the casing in place to 22,919 ft., in the 1 EE University, Phillips is in good position to drill to 25,000 ft. The company picked up a new combination string of drill pipe which gives best possible hydraulics and has now drilled below 24,000 ft. with a 5¾-in. bit, each foot drilled being a new record depth.

Holes in good shape . . . Phillips has kept the holes in these wells in good condition. Otherwise, it could never have worked in the 1 EE University with as much as 11,923 ft. of open hole exposed. Last string of pipe prior to this had been the 10,996 ft. of 9⅝-in. And, drilling had continued for many months after this string was set. Drill-stem testing and fishing operations had been carried on. Also there had been a successful sidetracking job at 19,965 ft.

Below 20,000 ft. in the University well, there was a section of the hole with a deviation of 9° off vertical. This caused as much as 40,000 to 50,000-lb. drag on drill pipe as it was pulled through. Adding graphite to the mud had reduced this drag to around 30,000 lb.

The 1A Montgomery, being drilled by Great Western Drilling Co.'s Rig

Another successful use for BAKER Packers... parallel string installations

Baker Retainer Production Packer Product No. 415-D

FEATURES

Holds any pressure from either above or below that is safe for the casing, even under temperatures in excess of 300°F.

Pack-off is independent of set-down weight or tension. Tubing string is free; just pick up (or unlatch and pick up) to remove it.

Use it as a squeeze and testing tool or as a temporary or permanent bridge plug in conjunction with any production application.

BAKER OIL TOOLS, INC.
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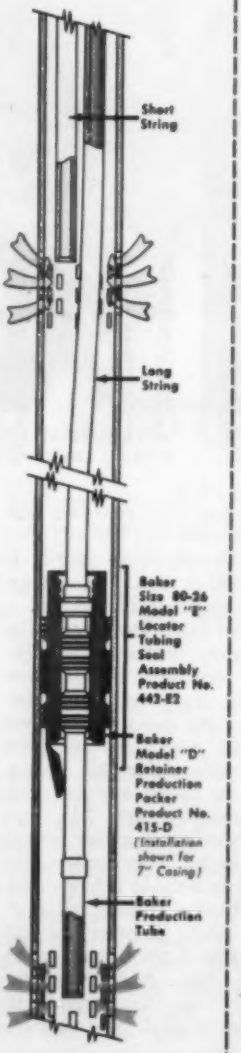
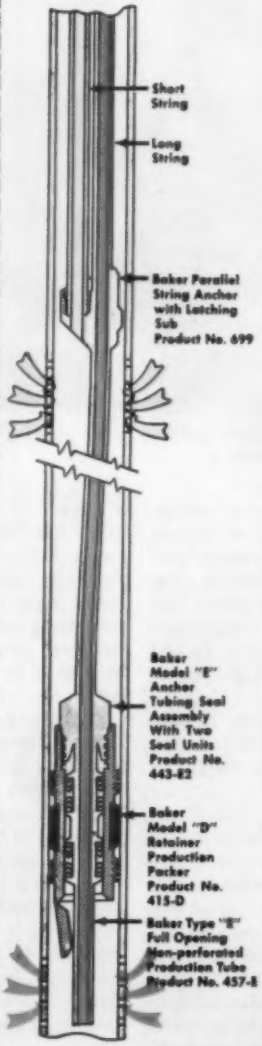
DUAL ZONE parallel string SHORT STRING HANGING FREE


Short String
Long String
Baker Size 80-26 Model "E" Locator Tubing Seal Assembly Product No. 443-E2
Baker Model "D" Retainer Production Packer Product No. 415-D
(Installation shown for 7" Casing)
Baker Production Tube

Permits removal of either string independently of the other regardless of sequence. Full-Opening (Tubing I.D.) Long String to lower zone.

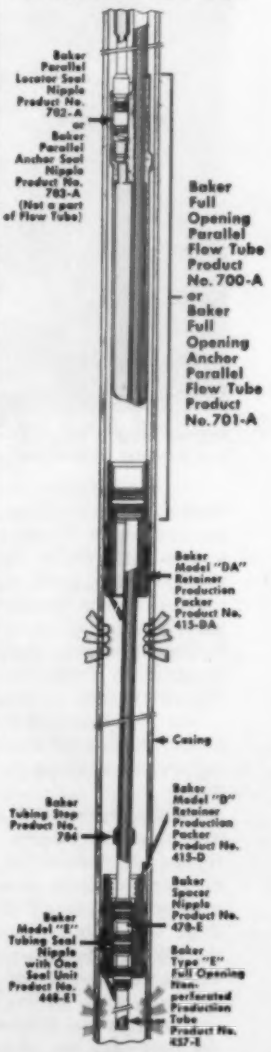
DUAL ZONE parallel string SHORT STRING ANCHORED


Short String
Long String
Baker Parallel String Anchor with Latching Sub Product No. 699
Baker Model "E" Anchor Tubing Seal Assembly With Two Seal Units Product No. 443-E2
Baker Model "D" Retainer Production Packer Product No. 415-D
Baker Type "E" Full Opening Non-perforated Production Tube Product No. 457-E

Permits removal of either string independently of the other, however long string must be run first. Short string pulled first. Full-Opening (Tubing I.D.) Long String.

DUAL ZONE parallel string TWO-PACKER HOOK-UP*

*Ask for details of "Retrievable Upper Packer" installations, and other parallel string hook-ups.


Baker Parallel Locator Seal Nipple Product No. 702-A or Baker Parallel Anchor Seal Nipple Product No. 703-A (Not a part of Flow Tube)
Baker Full Opening Parallel Flow Tube Product No. 700-A or Baker Full Opening Anchor Parallel Flow Tube Product No. 701-A
Baker Model "DA" Retainer Production Packer Product No. 415-DA
Casing
Baker Tubing Stop Product No. 704
Baker Model "D" Retainer Production Packer Product No. 415-D
Baker Spacer Nipple Product No. 478-E
Baker Model "E" Tubing Seal Nipple with One Seal Unit Product No. 448-E1
Baker Type "E" Full Opening Non-perforated Production Tube Product No. 457-E

Illustrates Two-Packer parallel string installation with each zone confined to its individual tubing string with full-opening to lower zone for use of all permanent-type completion tools.

44, has set a record for fast drilling—it required only 1 year and 1 week to reach 23,000 ft. This well is remarkable for the little trouble that has developed during its drilling and casing.

Both wells use a low-solids Driscose emulsion mud. Even at the elevated temperatures, water losses have been kept low with only moderate additions of Driscose.

High-strength pipe . . . As Tables 1 and 2 show, all of the pipe in the record strings except for short sections was of P-110 quality. Any such high-strength pipe has little ductility. As a result, cracks caused in the upsetting process, in handling, or in welding can easily cause complete failure. And Phillips had to make special provisions for this fact.

First, all of the upsets on the P-110 pipe were sandblasted and magnetic-particle inspected. While only a very few joints were rejected because of flaws found in this process, any one of them might possibly have caused a disastrous failure. Several joints were also thrown out of the strings because of damage inflicted during loading, hauling, movement on the racks, and the like.

Seams on the S-95 pipe were also magnetic-particle inspected.

In both strings, bottom five connections and the floating equipment were welded to prevent their backing off during subsequent drilling. To prevent underbead cracking in the P-110 pipe, Phillips preheated each spot to be welded to 400° F. Company metallurgists were on hand to inspect each weld as it was made. Then, after welding, the metal was allowed to cool in air to 200° F. before being lowered into the hole.

Some of these welds were made on the racks before the jobs started; these welds were magnetic-particle inspected on the racks; the welds made during the job were inspected at the rotary.

Preparing to run string . . . Derrick on Phillips' Rig 27, which drilled the 1 EE University, is rated at 1,000,000 lb. with relegs; derrick on Great Western's Rig 44 which drilled the Montgomery well is rated to 1,250,000 lb. relegged. Relegs were installed especially for the jobs. Also, new 1⅜-in. drilling lines were reaved with 12 lines to the blocks.

Calculated dry weight of one string was 719,000 lb.; the other weighed 728,025 lb. Buoyed in mud, each should weigh slightly in excess of 600,000 lb. However, highest actual weight-indicator reading was only 560,000 lb. above the weight of the blocks, hooks, and elevator (20,000 lb. total) on the 1 EE University. From this fact it appeared that the pipe was partially supported by the friction with the walls of the hole.

As precaution against failure, Phillips brought two complete sets of all pipe-handling equipment to each job; this included elevators, slips, and tongs. Moreover, Phillips magnetic-particle inspected almost all equipment that would be subject to the heavy loads. Elevator bails, earls, bowls, slip segments, traveling-block hook, and related parts were inspected. So were all lift plugs, floating equipment, and crossover subs.

Phillips didn't consider it practical to attempt reciprocation or rotation of such deep strings. For that reason, no scratchers nor centralizers were run.

Because there had been no loss of circulation, the outlook for cementing was favorable enough that no stage-cementing equipment was used.

Running the string . . . To run the complete 22,919 ft. of pipe took 28 hours. On the other job it required 22 hours to run the 23,000 ft. Four hours on each job was spent on the first five joints; connections on these were welded and had to be preheated and cooled in air.

The strings were filled continuously as run except for the last 5,000 ft. which were floated in. Float equipment consisted of Rector orifice shoes on bottom; Rector orifice collars one joint up; and fill collars on top of the second and third joints.

When the strings were run, they were halted at the bottom of the 9⅝-in. pipe and the holes were circulated for a short time. The pipe was then run to bottom without incident and without stopping. On bottom, circulation was established and maintained for a short time before cementing. There was some loss of returns on the University well.

Lightweight slurries . . . Slurries for the record strings were lightened with Diacel D* to avoid loss of circulation. On the University well, the slurry weighed only 10.8 lb. per gal., containing 40% by weight of Diacel D. The mix contained 1,147 sacks of Trinity slow-set cement; 42,127 lb. of Diacel D; and 1,617 lb. (1½% by weight) of Diacel LWL. The Diacel LWL acts not only as a water-loss-control agent but as a retarder as well.

*Driscose, Diacel D, and Diacel LWL are registered trade-marks of products made by Drilling Mud Specialties Co.

TABLE 2—CASING DESIGN 1A MONTGOMERY

Setting depth	Length (ft.)	OD	Wt./Ft. (lb.)	Designation	Dry. wt. (lb.)
0- 2,748	2,748	7⅝	39.0	P-110 Exline	107,172
2,748- 5,148	2,400	7⅝	33.7	P-110 Exline	80,880
5,148- 8,548	3,400	7⅝	29.7	P-110 Exline	100,980
8,548-12,060	3,512	7	26.0	P-110 Buttress thread	91,312
12,060-13,860	1,800	7	26.0	S-95 ST&C	46,800
13,860-14,487	627	7	29.0	P-110 Exline*	18,183
14,487-16,390	1,903	7	29.0	S-95 ST&C	55,187
16,390-19,020	2,630	7	32.0	P-110 LT&C	84,160
19,020-20,437	1,417	7	35.0	S-95 ST&C	49,595
20,437-21,650	1,213	7	35.0	P-110 Exline*	42,456
21,650-23,000	1,350	7	38.0	P-110 LT&C	51,300
					728,025

*Exline available in pipe yard. LT&C would have been satisfactory.

TABLE 1—CASING DESIGN 1 EE UNIVERSITY

O.D. (in.)	Weight (lb./ft.)	Type	Joints	Length (ft.)	Dry weight (lb.)	Safety factors: Tension	Collapse	Burst
7⅝	39.0	P-110 Exline	41	1,651	64,375	1.41	high	1 or above
7⅝	33.7	P-110 Exline	37	1,515	51,074	1.41	high	1 or above
7⅝	29.7	P-110 Exline	178	7,146	212,138	1.41	high	1 or above
7	26.0	P-110 Buttress	69	2,744	71,343	2.06	high	1 or above
7	29.0	P-110 8R, LT&C	87	3,472	100,689	2.04	high	1 or above
7	32.0	P-110 Hydril Triple seal	63	2,496	79,866	high	1.02	1 or above
7	35.0	P-110 8R, LT&C	65	2,602	91,061	high	1.04	1 or above
7	38.0	S-95 ST&C	12	472	17,934	high	1.04	1 or above
7	38.0	P-110 8R, LT&C	20	817	31,045	high	1.04	1 or above
			572	22,915*	719,525			

*Total length of casing string is 22,919. Difference is in the floating equipment.

On the 1A Montgomery, in which Sinclair Oil & Gas Co. has one-third interest, the slurry weighed only 12.7 lb. per gal. Only 1,009 sacks was used in this job.

In each well, neat cement was tailed in at the end of the job to encase the casing shoe and the lower portion of the string.

Total volume of cement was 10% excess over calculated open-hole volume on the University well. In this well, loss of returns continued until the cement was displaced around the shoe at which time full returns were regained. Later temperature logs showed the top to be at 4,100 ft.

In the Montgomery well, cement was brought only as far up in the hole as necessary to be inside the 9⅝-in. intermediate string. Temperature logs showed cement top in this well to be at 15,839 ft.

During cementing, pressures were kept low to prevent loss of circulation. Four Halliburton Oil Well Cementing Co. lo-boy units were used to mix and displace the cement on the University well. These four units alternated as two teams, taking cement from four 1,200-cu. ft. storage bins and one bulk truck. No such arrangement was necessary on the Montgomery well since the amount of cement used was much smaller.

On the University well, total mixing time for the 5,183 cu. ft. of slurry was 1 hour and 54 minutes; total displacement time was 1 hour 43 minutes. On both wells, over-all mixing and displacing time was well within the pumpability time calculated.

Slack off to nipple up . . . After the cementing jobs, the University well had 530,000 lb. hanging on the elevators; when the cement had set, the pipe was slacked off about 9½ ft. to leave some 300,000 lb. hanging on the tree.

On the Montgomery, there was 540,000 lb. after cementing. Then, by slacking off 18½ ft., some 290,000 lb. was left hanging on the tree.

The trees are National Type B assemblies. On the University well, the tree has a 2,000-psi. 20-in. flanged body with special landing base. This base takes a portion of the total weight into a foundation at the surface so that the complete weight of later strings is not thrown onto the 20-in. surface pipe.

The 20-in. bodies also contain an integral landing base to accommodate the 13⅜-in. casing. Above this is a 20 by 12-in. flanged 3,000-psi. body for suspension of the 9⅝-in. strings. The 7⅝-in. and 7-in. strings are suspended in 12-in. by 10-in. 5,000-psi. bodies.

City pipeline construction is faster with . . .

Induction-pressure welding

A NEW induction heat-pressure method has been developed for welding of steel pipe in congested areas.

The new mobile equipment uses induced high-frequency electric current with controlled pressure, torsion, and vibration. It has been tested successfully in city construction, the job for which it was designed for Consolidated Edison Co. of New York.

The new method is the result of 2 years of experimenting and developing by New Rochelle Tool Corp. with the goal of improving installation practices on electric, gas, and steam transmission and distribution systems.

Only 1½ minutes are required for a completed weld compared to an hour or more which Con Edison reports as average for manual welding. Exacting lineup requirements limit completed welds to about four an hour, with the mobile unit being moved from joint to joint either in the trench or on the ground.

Con Edison says it plans to do much of its field welding with this machine. It will handle pipe up to 14-in., and future welders will handle larger sizes.

Method and equipment . . . In induction-pressure welding, the pipe is heated by electric current induced from the coil which surrounds the pipe.

A specially designed jig lines up the pipe. Pressure of 2,000 to 4,000 psi., depending on pipe wall thickness, is applied by hydraulic clamps, also designed by Con Edison. Argon gas sprayed around the pipe shields it from the air during welding.

The buildup of metal, or upset, is around the outside of the pipe. There is no flash or slag to remove; no added weld metals such as are used in electric-arc welding are introduced. The current shuts off automatically when the weld is completed, producing a sound mechanically controlled weld which is not dependent upon manual skill.

A 100-kw., single-phase, 10,000-cycle-per-second electric generator, driven by a diesel engine, generates the high-frequency current. A water-cooled output transformer capacitor bank matches the work coil and pipe load to the generator.

The equipment is mounted on a 7½-ton Army surplus trailer, with an 18-ft. boom handling the transformer, coil, lineup jig, and clamps.

Welding processes compared . . . While Con Edison has advanced this type of mechanized or automatic welding, in its present stage of development it has no direct application yet to crosscountry pipeline welding. The reason is the long time required for lineup.

This problem has been a bar for 5 years or more in development of an induction pressure-welding process by other organizations for use in the field. This process in recent years has taken a back seat to carbon dioxide gas shielded metal arc welding in programs to develop a fully mechanized (nonmanual) technique.

Pipeline layers wear diving suits in this practical new way to dig . . .

Submarine trenches

This article deals with the nature of the equipment and operations of Collins Construction Co.'s patented submarine trenching machine. Attention is paid to:

- Jobs exemplifying what the machine has accomplished.
- How the equipment works, and provisions for the protection of the divers.
- Policies followed for burying submarine lines to protect against damage by marine organisms.

BY S. V. COLLINS AND PAUL REED

A JETTING MACHINE specially designed for working directly on the bottom for submarine trenching has many advantages over the conventional methods applied largely by operating from barges.

Experience with such submarine trenching machines on a number of projects in different parts of the world has demonstrated three significant features:

1. The trenching machine can trench at greater depths of water than conventional methods.
2. It can frequently bury pipe at greater depths below the bottom.
3. It can do a variety of submarine trenching jobs at lower cost.

The submarine trenching machine is a tool for a new technique operated on the bottom where changes in the manipulation of equipment are made by divers.

A versatile and economical submarine trenching machine is needed to an increasing extent to serve the growth of pipeline construction in rivers, harbors, and offshore.

AN OUTLINE of the excavation can be seen as S. V. Collins' trenching machine works its way up onto the beach at Seal Beach, Calif., during a submarine pipeline installation for the Monterey Oil Co.

Submarine Burying Policies

All major offshore production lines, sea-loading lines, and other permanent underwater pipelines under construction today are being buried below the bottom.

The exceptions are cases where bottom material is solid rock. Experienced operators have learned that a few feet of cover for underwater lines provides permanent protection against marine organisms and damage by wave action, ships' anchors, trawlers, and other man-made objects.

For burying pipelines in deep water or in open water, a jetting principle has proved to be the only effective method that can effectively be employed in silt, mud, clay, or sand.

In a single pass over the pipe, the submarine trenching machine can cut a trench from 12 in. deep in running sand to 3½-4 ft. in clay. Multiple passes will provide almost any depth. The machine has been operated successfully in 130 ft. of water, and has lowered pipe to a depth of 35 ft. below the bottom.

The trencher can be used at greater water depths simply by lengthening the hoses supplying the water and air. Trench depth is limited primarily

S. V. Collins is with Collins Construction Co., Port Lavaca, Tex. Reed is pipeline editor for The Oil and Gas Journal.

RESULTS of one pass over the pipeline by the submarine trencher can be seen in the background during low tide in the Bay of Bombay, India. The machine during this operation could be operated in the shallow bay only during high tide.

by the formation of bottom material. In good bottom material, any reasonable depth can be attained.

Trenching Projects

These submarine trenchers have been used extensively along the Texas Gulf Coast, the California coast, in the Mississippi River and other inland waters; as well as in the Far East and in South America. For the past 10 months Collins trenchers have been operating offshore in Louisiana.

Advantages of this machine over conventional methods of excavation were exemplified in India during the Bombay Port Trust project contracted by Collins.

Dredging the seven trenches required for the 17-mile pipeline network would have meant the removal of at least 20 million yards of material. By using the trenching machine the same result was accomplished by moving only a half million yards. The saving in dredging costs alone was enough to pay for the entire submarine pipeline installation.

The trencher was first used in the Gulf of Mexico to lower Marine Gathering Co.'s 8-in. gathering line offshore at Grand Chenier, La. Soon afterward it successfully lowered Transco's Hudson River, crossing at 134th Street, New York City, at an average of 17 ft. below the bottom, after all other methods had failed.

Recently a trenching machine unit worked 20 of 24 days in the Louisiana West Delta area in lowering 9.5 miles of 12-in. pipe for Commonwealth Oil Co. Risers were lowered 10 ft. and the remainder of the line was given a 6-ft. cover by the trencher. Maximum water depth in that area was 67 ft.

The machine buried the pipeline approximately 2 ft. below the bottom on the initial pass. Three additional passes lowered the pipeline to grade.

The 57-mile CATC gathering system in the East and West Cameron areas in offshore Louisiana is a network of pipelines ranging in diameter from 12 to 26 in. Burial of these pipelines is one of the most challenging trenching projects.

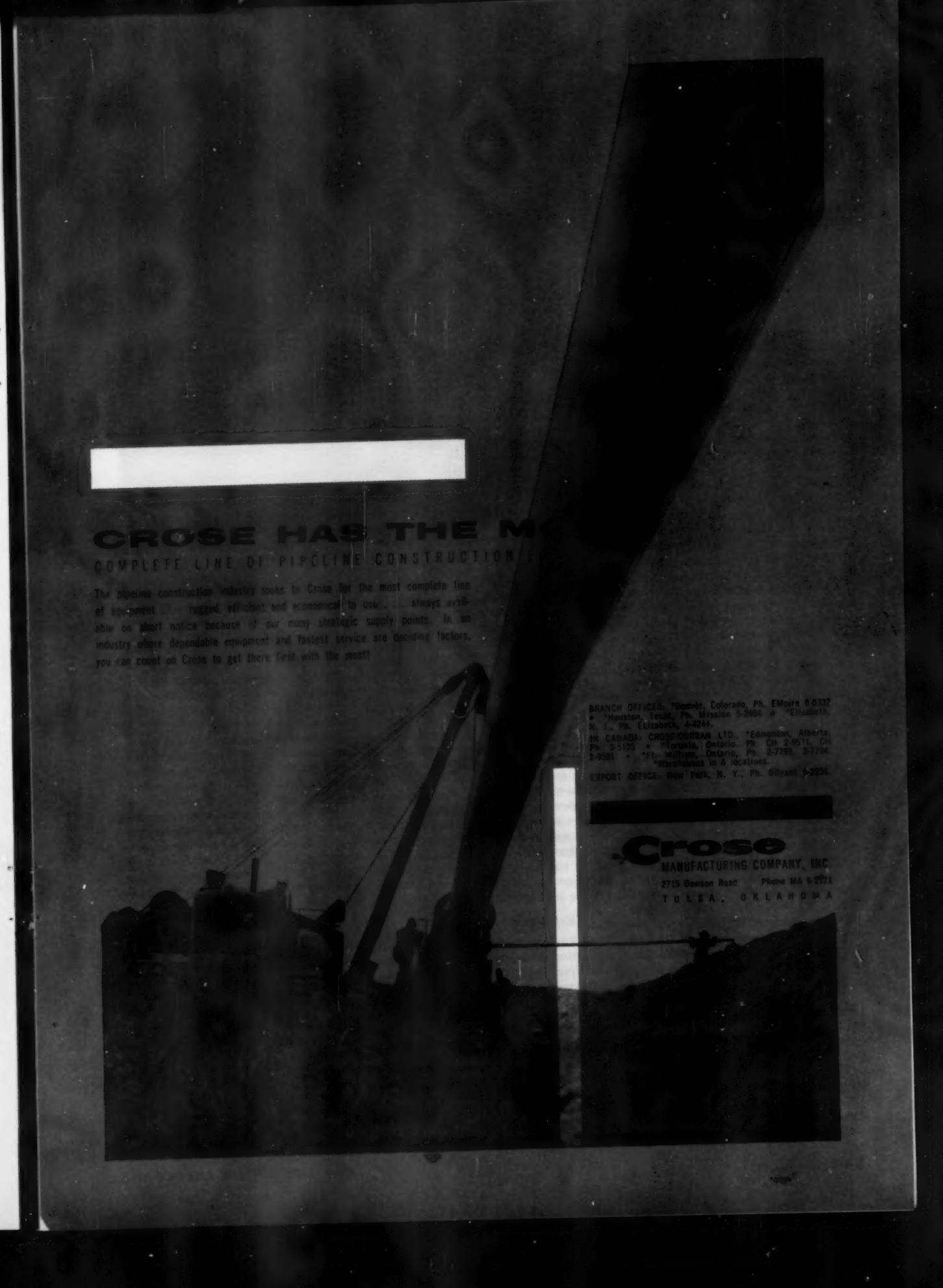
How does the trencher work? What is it? The trencher fits around the pipe and sluices away the bottom material with high-pressure jetted water and air as it moves along the line.

The machine itself consists of a framework of welded piping fitted with a series of nozzles on each of its four runners. These nozzles are fed through the piping of the frame. They are set in a pattern aimed to cut and flush out solid material 3 to 4 ft. below and ahead of the machine.

Air is fed to the machine to aerate the cut material, carrying it up and away as the machine works. Both air and water come to the machine through heavy-duty submarine hoses from surface-barge facilities.

The success of the trencher is largely dependent upon a correct mixture of water and air in the mixing chamber of the machine. This mixture directly affects the cutting power of the trencher and the removal of spoil from the ditch.

Two sets of rollers fit around the pipe to hold and guide the trencher. The bottom roller of each set of four is hinged to open as the trencher is lowered to the line. It can then be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closed and latched onto the pipe by a diver. Rollers are made of natural rubber to prevent damage to the pipe coating. They are the only parts of the machine to touch the pipe. No metal parts are allowed to touch the pipe or its coating at any time during a trenching operation.

The upper part of the trencher carries two controlled buoyancy tanks to provide stability and carry the weight of the machine. The tanks also effectively offset the reaction of the air-water jet stream expelled from the machine.

Tender Barge and Tugboats

The trenching machine is handled from an A-frame on the rear deck of a tender barge. Pumps and air compressors are located on the barge. A four-drum anchor winch on each barge regulates tension on four anchor lines to position the barge while the trencher is being operated. When the machine works up to the forward anchors, tugboats reset the anchors while the trenching operation continues along the pipe.

Three three-stage centrifugal pumps mounted on the tender barge are manifolded to furnish high-pressure water to the trencher. Each is powered by twin 300 hp. diesel engines.

The machine is moved along the pipeline by a winch or tugboat. It cannot be moved forward until the bottom material has been cut away in front of the machine.

Auxiliary equipment such as generators, tool houses, welding machines, and complete diving rigs are contained on the tender barge.

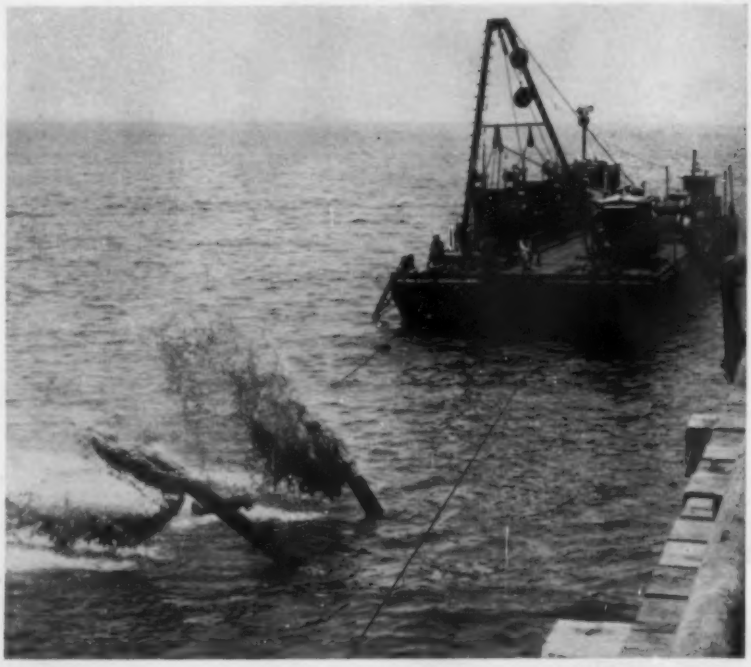
Divers and Operations

Of the five-man crew necessary for a trenching tender barge, at least three must be experienced divers. Placing the machine on the line, changing directions of travel, and inspection of the trench require a diver.

During good weather the trenching barges stay on location indefinitely and the trenchers are operated 24 hours each day. A close check with the weather bureau enables barge foremen to move equipment to sheltered waters and back to the job site with a minimum loss of time from bad weather conditions.

While lowering a 26-mile pipeline network offshore at Grand Isle, Louisiana, during the fall and winter months, Collins' trenching could not operate more than 1½ months of 6-month period.

Hurricane Audrey halted operations temporarily in the fall, as did tropical storm Bertha. Winter disturbances frequently forced the barges to sheltered waters. Ground swells in excess of 6 ft. often caused the water level to drop below the ends of the pump sections, resulting in a loss of prime.



SIPHONS are attached to the trencher when working in running sand to aid in removal of spoil from the ditch. Here, the trencher is being operated near El Segundo, Calif., where 18 ft. of cover was provided near shore to an ocean outfall line installed for the city of Los Angeles.

Currently there are three trenching rigs in operation by the Collins organization in the Gulf of Mexico. Quarter boats are being used to accommodate the 5-man crews on the trenching barges. These vessels lay at anchor away from the barge during working hours, and pull alongside at mealtime.

Developers of the trenching machine no longer restrict its use to Collins-built pipelines. The addition of 5 new trenching machines and 15 new pump units during the past year now enables the organization to accept contracts for the trenching phase of a submarine-pipeline installation alone or for all other phases of submarine pipeline construction.

Recompression for Divers

A vital part of deep submarine pipelining is adequate provision for recompressing divers when they come to the surface. Effective two-chamber equipment is unusual, costly, and still rare in pipelining. Since it is a vital part of diving technique which will be essential in future submarine pipelining, it should be explained.

First it may be pointed out that inability of a diver's circulatory system to eliminate nitrogen absorbed by his blood and tissues during his exposure to compressed air, without excessive bubble formation, usually results in caissons disease (bends).

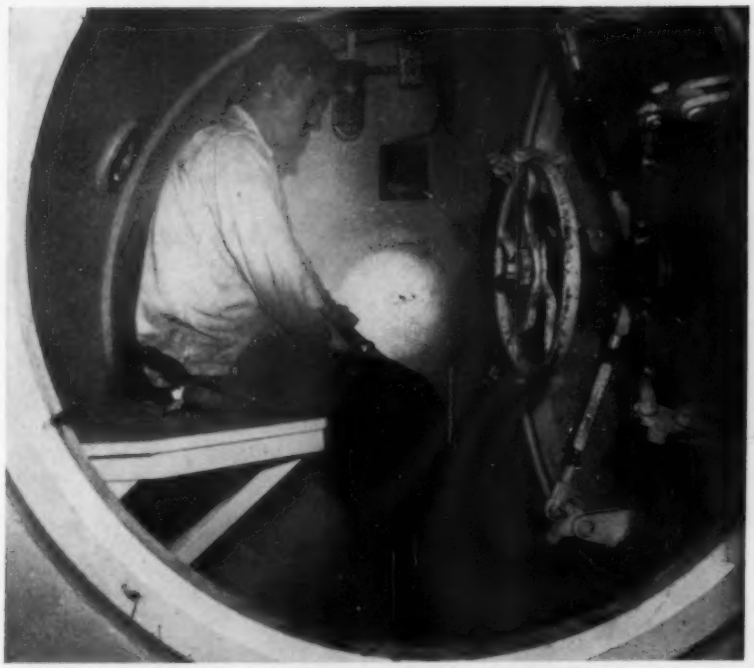
If a diver surfaces too rapidly there is a danger of tissues and blood becoming supersaturated (They contain more dissolved nitrogen than they are capable of holding in solution at the reduced pressure). The gas liberates itself in the form of bubbles in the blood and body tissues.

Divers who have developed this disease must either be rushed to the nearest recompression chamber, or lowered again to the depth at which they had been working, and decompressed at various levels or pressure areas in the water. Treatment involves the reduction in size of the bubbles, to approach soluble state, by application of pressure and reabsorption of the gas from the bubbles by the passing blood stream.

The recompression chamber, which is stationary on the barge, is composed of two compartments, each of which can be individually pressurized.

To better explain, here is a hypothetical case. A diver has been down 175 ft. The barge from which his life line comes is wallowing, and tossing, due to rough weather on the surface of the sea. This action of the barge passes along to the diver through his air hoses and his life line and has a tendency to jerk and toss him also.

Having been at this depth and also having worked his optimum time, it



BUILT to U. S. Navy specifications, Collins' recompression chamber has two compartments to allow passage of a diver's tender in and out of medical lock without variation of pressure. Dual controls enable pressure regulation either from inside or outside. Cost of the chamber was $35,000.

would require the long time of 101 minutes for the diver to safely ascend to the surface of the water. The ascension would necessarily have to be interrupted at various depths for set periods of time so that his body could properly regain its normal functions.

Rather than spend this long period under the sea and be subject to the inherent dangers and discomfort, as well as to the buffeting transmitted from the barge, the diver ascends immediately to the surface of the water at 25 ft. per minute or less. His suit is removed, the front door of the recompression chamber is opened, the diver enters, closes the front door and then opens the door to the second compartment and enters it.

He then closes this door which makes both compartments airtight. He can then sit down or lie down as he desires. The pressure in the second compartment is then built up to the equivalent pressure that the diver was subjected to while on bottom. This pressure is gradually decreased so as to stimulate the controlled ascension under the water.

Under the same hypothetical situation, let us assume that the diver needs aid or assistance for some reason. He has two-way communication to the outside of the recompression chamber. He signifies his desire for assistance by means of the two-way communication. The helper known as the tender then opens the front door, steps in, closes the door, and at this point the pressure in compartment No. 1 is built up to equalize the pressure in compartment No. 2. The pressure of each compartment is indicated on individual gages on the outside and inside of the recompression chamber.

Depressurizing Compartment

When the two compartments are equally pressurized, the tender then opens the door to compartment No. 2 and goes in and administers to the diver. He then steps from the second compartment to the first compartment, closes the door on the second compartment, depressurizes the first compartment and opens the door and steps out on the deck of the barge.

Should it be necessary, you can accommodate as many as six people in the recompression chamber; however, you could only have two different pressures at one time. This is a lubricator, using air instead of fluid.

The Collins Trenching Barge No. 1 has on board the only recompression chamber in the Louisiana Gulf Coast area. Built to U. S. Navy specifications, this air lock consists of two chambers to facilitate the passage of a diver's tender to and from the medical lock without a resulting variation of pressure. Pressure may be controlled from either chamber or from the outside. An intercom system enables communication from either inner chamber to the outside.

Before this chamber was placed in service, the only other recompression chamber on the Gulf Coast was located in Jacksonville, Fla. Collins built the unit at a cost of $35,000 to safeguard divers during the company's extensive trenching operations in the Gulf of Mexico.

Submarine Obstructions

Submerged objects often interrupt the progress of the trencher as it works along a pipeline. Discarded or lost articles such as anchors, cable, angle iron, tires, logs, fuel drums, chain, piling, and even boat hulls have been unearthed by the trencher.

An unexploded bomb was uncovered in the Bay of Bombay during a Collins trenching operation. In the Pacific Ocean near Los Angeles, the trencher was obstructed by a piece from an airplane's fuselage; and in Galveston Bay a brick chimney was hauled on board after having blocked the trencher's path.

Discovery of this variety of submerged objects emphasizes the need for burying a submarine line.

Reasons for Burying

As submarine pipelining has progressed there has been growing recognition of the need for burying submerged lines.

Useful length of service for "unprotected" or unburied pipelines has been decidedly reduced due to damage by marine organisms and by corrosion.

Sponges, annelids, crustacea (isopods and barnacles), bivalve shellfish or mollusks, and sea-urchins are common rock borers that have been known to inflict damage to submarine pipeline coatings.

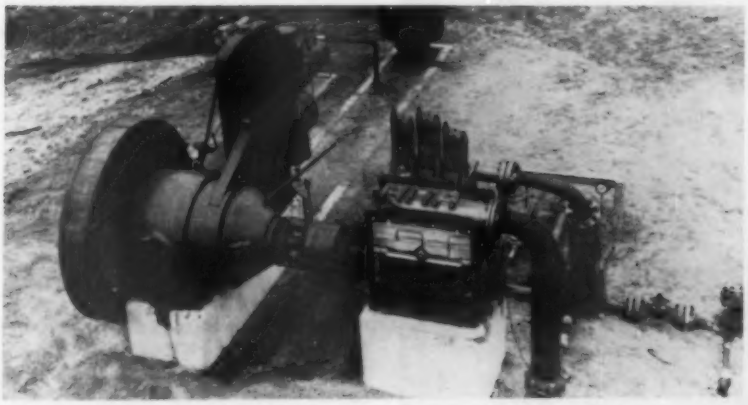
The mollusk is the most destructive of all boring animals. A well-known mollusk is the Petricola pholadiformis (Phola), one of the most efficient rock drillers in the world. It attaches itself to a rock at birth and starts drilling. Boring stops only when the animal dies.

The mere process of inhaling and exhaling water is sufficient to give the animal's rasp-like body a slight twist. This small movement repeated millions of times enables the Phola to penetrate as much as 24 in. of rock in a lifetime. The Phola has been known to perforate pipelines.

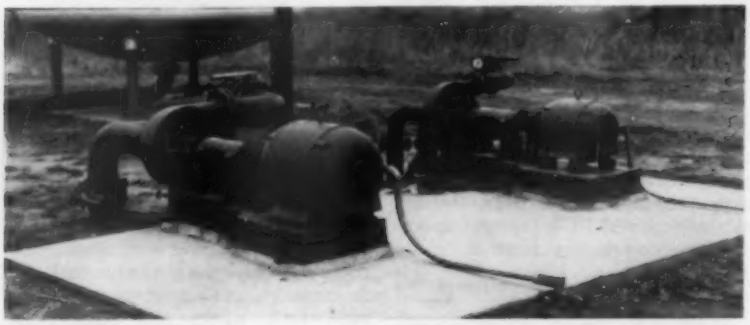
The marine organism can survive in mud only so long as its tail, about 18 in. long, remains in water. Therefore, lines buried with 18 in. of cover escape damage from this and most other organisms. A minimum cover of 3 ft. is usually given the pipe, however, to provide a safety factor against possible scouring damage.

In Oklahoma's Creek County

Water flooding reaches deeper



THE TREND in today's water-flood operations is to hold construction costs to a minimum and most water pumps have no housing over them. Note that the crankshaft of this Creek County water-flood pump is immersed in an oil bath which has a transparent side.



ANOTHER EXAMPLE of the trend towards open-air installations in water-flood operations is shown here, where two electric motors are mounted on the concrete block without any shelter.

NORMAN S. MORRISEY
Drilling-Development Editor

WATER FLOODING in Oklahoma is gradually expanding into the deeper areas.

For a long time the shallow Bartlesville sand at 500 to 1,200 ft. held the operators' interest in Washington, Nowata, and eastern Osage counties. Now, however, operators are forced to look to the deeper areas of Oklahoma for water-flood prospects.

Creek County in particular in recent years has been canvassed thoroughly for possible floods, and operators are now beginning to reap the benefits.

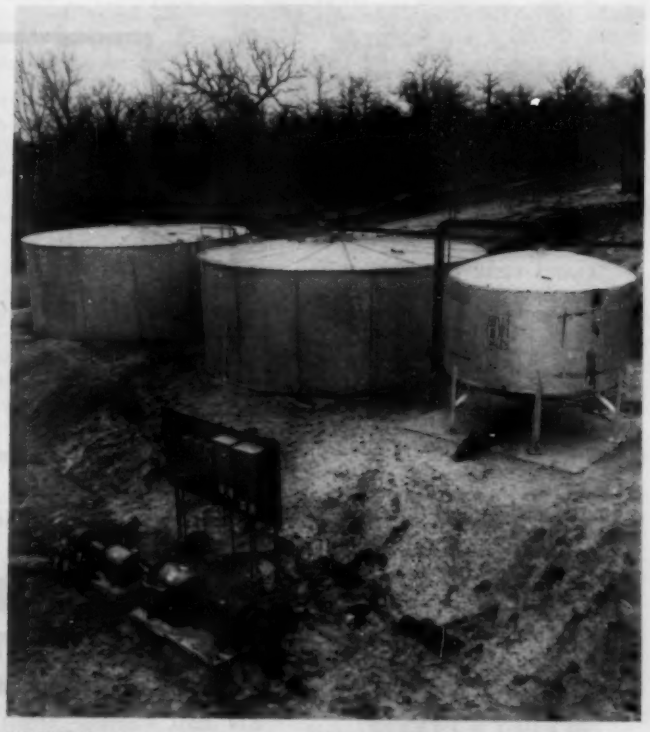
The principal water-flood objectives are sands in the Pennsylvanian section found at depths ranging from 1,200 ft. to as much as 3,500 ft. in Creek County. Among them are the Layton, the Prue, the Skinner, the Red Fork, and the Bartlesville. Under favorable conditions, all of these zones will respond to a water flood.

With the shift toward deeper water-flood projects, there is also a change in water-flood methods. Today operators are concentrating on ways to reduce costs, eliminate breakdowns, and improve the efficiency of the water floods. Ideas currently in vogue and in actual operation in Creek County are shown in the accompanying photographs.

THIS TRAILER-MOUNTED PORTABLE TANK is used by Gulf Oil Corp. to test wells on its Yarhill water flood in Creek County. Gulf simply connects up the well to be tested and, when testing operations at the header are over, hitches it to a pickup truck and hauls it to another location for testing operations.

THE COMPRESSOR ENGINES were quite noisy in this Creek County installation until the operators installed the three mufflers shown. Before the mufflers were used, the ranchers voiced several complaints about the noisy engines; since installing the mufflers, there have been no noise problems.

VIBRATION elimination was satisfactory in waterflood injection lines when rubber couplings were used.



NOTICE that even the control panel in this Creek County water flood project is exposed to the elements. A saving is effected since it is not necessary to build a shack to house the pumps and control panel.

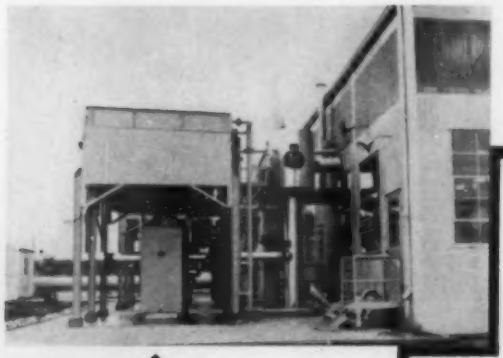
UNITED GAS PIPE LINE CO. INSTALLS VAPOR PHASE®

to cool 3 compressor units with own waste heat

System Increases Engine Output and Life; Reduces Cylinder Wear; Would Permit Use of Sour Gas Fuel

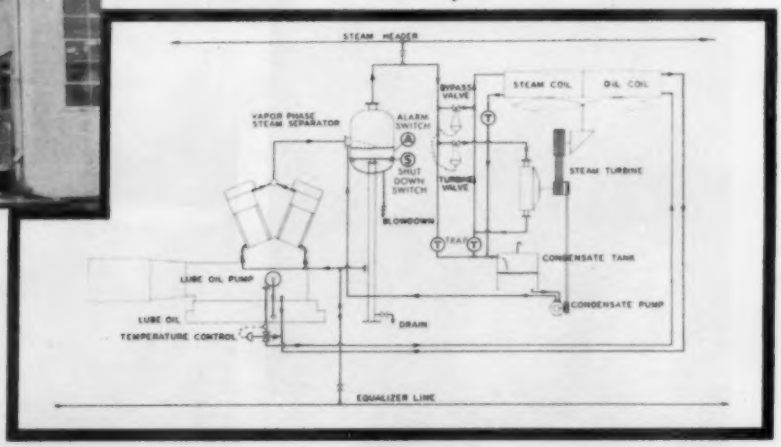
The 3-880 H. P. Gas Compressors at UGPL's Cabeza Creek station, near San Antonio, Tex., installed in 1957, are taking the power to drive their cooling fans from the waste heat of their own operation. The formerly wasted heat is taken from the VAPOR PHASE® separators in the form of low pressure steam. This steam drives the cooling air fans through steam turbines, an exclusive patented feature of the Vapor Phase System.

The decision to install Vapor Phase® Thermal Circulation Cooling was based on the successful operation of a similar installation, made in 1953, on 5-880 H. P. engines at UGPL's Agua Dulce Station which resulted in better combustion, reduced cylinder and ring wear and lowered operating costs.



CABEZA CREEK STATION — Steam generated from waste heat passes through Vapor Phase® Steam Separator and operates turbine driven fan, condensing the steam and cooling the lube oil. Operating costs are reduced while freeing the engines for greater power output.

VAPOR PHASE® FLOW DIAGRAM — water and steam from the engine power cylinders flow through a header to the Vapor Phase® steam separator. Steam produced powers the turbine driven fan which furnishes air to dissipate engine heat. All condensate is returned to the water and steam header. Water from the separator circulates through the power cylinder jackets by gravity.



"Sole Developers and Manufacturers of Vapor Phase® Thermal Circulation (Ebullition) Engine Cooling"

ENGINEERING CONTROLS, Inc.

AN AFFILIATE OF ST. LOUIS SHIPBUILDING & STEEL CO.

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Los Angeles 27, California

The

REFINER'S NOTEBOOK

WASTE DISPOSAL—PART 5 (CONCLUSION)

How to determine sulfides

BY C. K. RICE

THE DETERMINATION of sulfides in the waste from an oil refinery is important primarily because of the possibility of an unsightly appearance caused by combinations of iron and sulfide, and to the bad odor and taste which might be imparted to public water supplies.

In many areas of the country the sulfides discharged from a petroleum refinery are so insignificant as to require no attention whatever. In other parts of the country this is not true. The amount of sulfides discharged by an oil refinery depends largely upon the type of crude oil being processed. In certain isolated cases the problem may become of prime importance.

Methylene-blue . . . Probably the most widely used method for the determination of sulfides in waste water is the methylene-blue colorimetric procedure. This has been published by the API,[1] by ASTM,[2] and in "Standard Methods."[3] The method is rapid and of reasonable degree of precision and accuracy under most conditions. It is based on the reaction that takes place between paraaminodimethylaniline, ferric chloride, and the sulfide. The result of this reaction is the formation of methylene-blue.

The presence of more than a small quantity of sulfite or thiosulfate ions will reduce the development of color. The application of the method in the presence of such ions may be extended by the addition of more ferric chloride and an increase in the reaction time.

Sulfur compounds in the reduced state such as polysulfides will decompose to form sulfides, and thus be determined. In addition, materials such as dye intermediates, cyanides, and iodides in appreciable quantity will interfere by producing strange colors or retarding the formation of color.

The precision and accuracy of the methylene-blue method varies with the concentration of sulfide. It may be good to within 0.1 p.p.m. or it may be good only to approximately 15% of the sulfide present.

Author is coordinator, refinery technology laboratory, Gulf Oil Corp., at Philadelphia. Paper was presented at WPRA waste-disposal symposium at Wichita.

Other methods that may be used for this determination include the evolution of sulfides followed by an iodimetric titration, an electrometric titration with silver nitrate, and (in the case of nonionized hydrogen sulfide) a relation of pH to sulfide content. All of these methods have drawbacks related to either time consumed, involved apparatus, or insufficient accuracy.

Turbidity

The turbidity of a waste effluent from a petroleum refinery may be of importance in reference to the discharge of catalyst fines, coagulants, coke, clays, sediment, or wax. Turbidity is an optical property of water containing suspended matter which is caused by the scattering of light rays as opposed to their transmission through the water.

Correlation of turbidity with the concentration of suspended matter does not exist because of the influence of the size, shape, and refractive index of the particles present.

Jackson candle . . . The standard Jackson candle method measures turbidity from the light path obtained that causes the image of a candle flame to just disappear. The greater this path of light, the lower is the turbidity of the sample. The method has been published in "Standard Methods"[4] and in the API Manual on Disposal of Refinery Waste.[5]

Although they do not always produce identical results because of differences in optical systems, other instruments are frequently used for making this measurement. Such instruments normally have been standardized against the Jackson candle. Attempts are being made by practically every standardizing organization to find either an improvement in the Jackson technique or a completely new substitute for the method. At present, these efforts have not been very rewarding.

Selection of Test Methods

From this discussion it may be seen that a variety of methods for a few properties is available to the analyst. The necessity of careful choice and a knowledge of its proper application becomes readily apparent. The mere fact that several different methods are available for each of the prime qualities being measured frequently results in confusion and misinterpretation.

Work toward a single test . . . An ideal situation would be to have a single method of test for each quality to be measured. This is an ideal that is not completely impossible. Time after time each of the leading publishers of methods will refer by means of a footnote to the fact that its method is similar in content, or will provide the same result, as that published by another. Here is an attempt among the leading standardizing organizations in this field to come together toward the end that the analyst shall be provided with the best method of test in each case.

Cooperative program . . . Not quite 2 years ago a new program of cooperation on these methods of measurements began. The Joint Committee on Uniformity of Methods of Water Examination was formed. Twelve of the leading standardizing organizations in the field of water testing have come together to find harmony and agreement of thought. Some of these are governmental agencies. Some are varied interest groups such as ASTM. Others are more nearly described as trade organizations.

The purpose of this joint committee is to secure uniformity in the technical aspects of methods for testing and analyzing water. The recommendations that come out of its deliberation are advisory only and do not supplant the publications of any of the participating interests. All of these member organizations are dedicated to the ideal that whatever method is applied, the user should obtain the same numerical value.

References

1. API 711-53, "Manual on Disposal of Refinery Wastes," Vol. 4, API.

2. ASTM D 1255-53 T, "Manual on Industrial Water," ASTM Special Technical Publication No. 148-B, p. 379 (1956).

3. "Standard Methods for the Examination of Water, Sewage and Industrial Wastes," Amer. Pub. Health Assoc., Inc., 10th Ed., pp. 275-278 (1955).

4. "Standard Methods for the Examination of Water, Sewage and Industrial Wastes," Amer. Pub. Health Assoc., Inc., 10th Ed., pp. 207-211 (1955).

5. API 719-53, "Manual on Disposal of Refinery Wastes," Vol. 4, API.

There Is Absolutely NO CARROT in the new WELEX

SUPER DYNA-JET*

This is no idle claim. *There is only one shaped charge perforator available in the oil field that absolutely will not produce a carrot.* That charge is the new Welex Super Dyna-Jet. Utilizing many of the principles of the original Dyna-Jet perforator, which introduced a new concept of perforating, the Super Dyna-Jet is another forward step by the company that brought you the first shaped charge perforator.

Added to the impossibility of carrot formation by the Welex Super Dyna-Jet is the advantage of greatly increased penetration, large entrance hole, greater hole volume and tremendously increased flow index.

The Welex Super Dyna-Jet was created for one purpose: to completely eliminate the possibility of forming a carrot which could plug a perforation and retard flow. In addition to being a completely carrot-free perforator, the Welex Super Dyna-Jet produces less burr than is possible with other shaped charges. The average burr height after perforating with the Super Dyna-Jet is 0.03", virtually no burr at all.

Performance-wise, the Welex Super-Dyna Jet leads the field by a wide margin. Shooting into 16-day neat cement faced with a mild steel plate and through one-half inch of water, the following performance data was obtained:

Penetration Depth	13.28"
Entrance Hole	0.48"
Hole Volume	30.00cc
Burr Height	0.03"

Available in 3⅜", 4" and 5" hollow carrier guns, the Welex Super-Dyna Jet means more production every time.

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*Trademark of Jet Research Center, Inc.

Recent foaming-agent tests may throw new light on

How to handle water during air drilling

ONE of the uppermost problems of air drilling occurs when a water formation is encountered, and cuttings ball up, and normal air circulation through the drill pipe and up the annulus is cut off.

One way to get rid of the formational water is to literally "foam it out" and that is what is being done in an experimental drilling setup in the Booneville area. The rig is a heavy-duty rotary operated by Parker Drilling Co., Tulsa, approximately 35 miles east and 10 miles south of Fort Smith.

Air - compression equipment was rented from Oil Field Technical Service Co. of Midland, Tex. Four two-stage compressors were used; these were rated at 475 cu. ft. per minute at 350 psi. They are portable and are operated by 225-hp. engines. Surface conductor pipe was set at 150 ft.

Minor amounts of water were encountered, but air drilling was conducted in the hole to approximately 350 ft. At this level, however, formational water was drilled into, with the output rate into the return air stream estimated at 7 to 10 bbl. per hour. The air circulatory rate was approximately 2,000 cu. ft. per minute.

Foamer used . . . At this point, one type of foaming agent was added at the rate of 3.5 qt. per hour, together with the injection of 2 to 4 bbl. per hour of lime water. The foaming agent was injected with a small Tex-Steam air-operated pump, and the water was injected with a small reciprocating power pump. The combined streams were pumped into the rotary standpipe. The primary purpose of the lime water was to prevent corrosion and, of course, it acted as a carrier for the foam chemical agent itself. The pH of the water had been raised to 14 by the addition of 4 lb. of lime per barrel of water. The lime concentration was sufficient to maintain the high pH when the solution was diluted by bottom-hole water.

This rate of injection, 3.5 qt. of foaming agent per hour, was continued during the drilling from 350 to 530 ft., the air pressure at the standpipe ranging from 110 to 130 psi.

Second foamer used . . . At this depth, a switch was made to another chemical agent, Armour Chemical Division's "Armomist No. 1." Within 40 minutes the formational water flow ceased entirely, and the air injection pressure climbed to 150 psi. This indicated that the foaming-agent mixture might be too rich, and accordingly injection was shut off for 1 hour. After this time, returns began to show up again, in heads, and the water was in the form of rich foam.

For 30 minutes, the foam slugs came at quicker intervals, and in small heads. There finally was one large water slug through the "blooey" pipe, and then a steady mist of foam appeared in the returns. At this point the Armomist injection was started again.

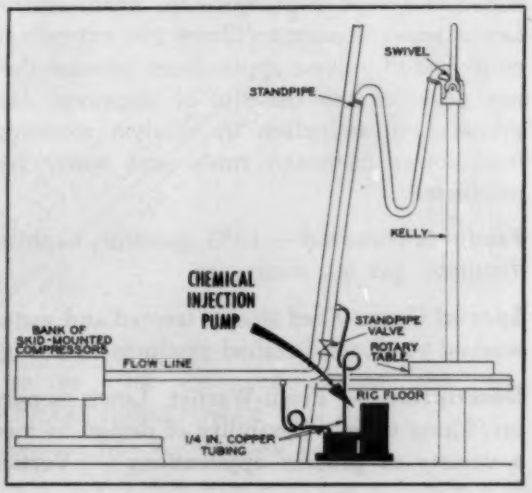
The injection at this time began at 1 pt. per hour and was gradually increased to a rate of 2 qt. per hour. The accompanying water injection rate was 2 to 4 bbl. per hour. Pressure at the standpipe was 90-120 psi. The operator continued to drill using foam to 900 ft. and experienced no difficulty. At that point, 10¾-in. casing was run as surface pipe, the customary practice in this area. Operator then drilled with straight air to 5,358 ft. At that time the well was making approximately 200 M.c.f. of gas per day. No formational water had been encountered between 900 ft. and 5,358 ft. but the hole was caving badly so the operator decided to convert to a mud system.

The results using the Armomist were most gratifying, and other field tests have proved the value of this foaming agent in handling water during air-drilling operations.

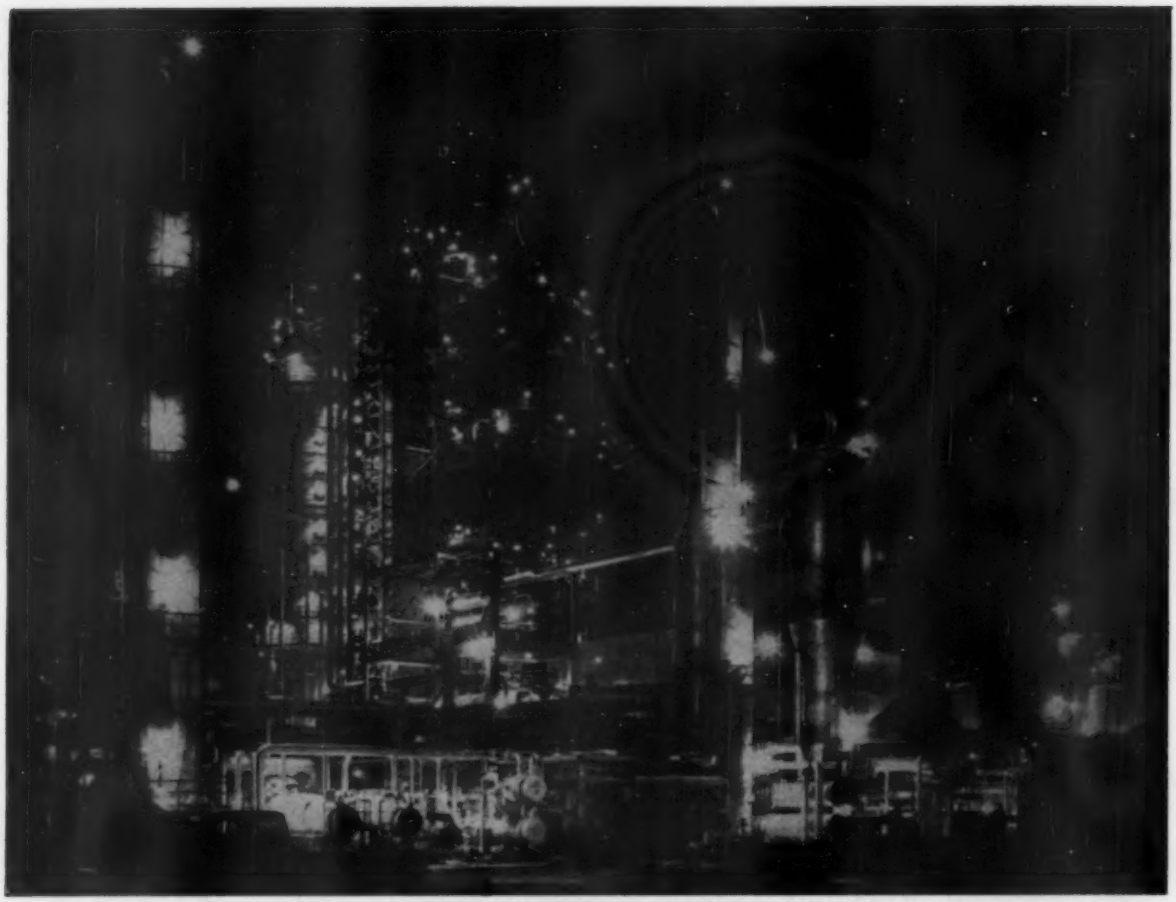
Foam agent . . . The addition of the surface active compound (the foamer) lowers the surface tension of the water. The surfactant molecules consist of both hydrophylic and hydrophobic portions. Both of these affinities are satisfied if the molecules occur at bubble walls with their polar, hydrated end adhering to the water phase, and their nonpolar end away from it so that "frother" molecules concentrate at the interface between fluid phases.

As a result, the bubbles are more or less completely lined with a monomolecular sheath of surface - active molecules. This allows each bubble with its lining to come in contact with other bubbles without coalescing. This forms a froth.

Also, the foaming agent has a corrosion-inhibitor effect due to adsorption of the cationic surfactant on a metallic surface, giving a protective film.



A SMALL chemical pump injected the foaming agent into the flow line. The lime water (to prevent corrosion) was injected into the line with a small reciprocating power pump, not shown in this simplified diagram.



WORLD'S MOST MODERN REFINERY — Tidewater Oil Company's new Delaware Refinery, 15 miles south of Wilmington, represents the most advanced thinking of refinery engineers and technologists.

LOW-COST WATER AND SOLIDS REMOVAL—A BASIC FOR MANY REFINING AND PETROCHEMICAL PROCESSES

Separator/Filters have multiple uses

Applications — In today's modern refineries and petrochemical plants, many processes are highly dependent upon low-cost removal of water and solid contaminants. Fram-Warner Lewis water separator/filters are extensively employed in process applications because their use provides the benefits of improved feed preparation, reduction in catalyst consumption, lower corrosion rates, and water free products.

Products Handled — LPG, gasoline, naphtha, distillate, gas oil, aromatics.

Special Uses—Feed stocks, treated and water-washed products, finished products to storage.

Description — Fram-Warner Lewis separator/filters offer a flexibility of design to meet a variety of process applications — Vertical single stage, horizontal single stage, horizontal two stage separator/filters with entrained water removal efficiencies of 90 to 100% and filtration efficiency down to 5 microns particle size. Engineering design and pressure vessel fabrication facilities at Warner Lewis Tulsa plant are always available to handle special problems to customer specifications. Let proven experience in the field in countless process applications help you.

For Further Information — Write Process Section Warner Lewis Company, Division of Fram Corporation, Box 3096, Tulsa, Oklahoma, for Process Manual on water separators/filters. Warner Lewis representatives are located throughout the United States and Canada and they will be glad to contact plant processing and operating personnel.

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

Cost of refinery power

THE CHART shows the hourly and daily operating costs of various types of power drives, in terms of unit prices that can easily be converted by ratio to actual unit costs. Thus, the chart is based on an electricity cost of 1-cent per kw.-hr., so that the cost is only 85% of that of the chart if the price of electrical power is 0.85 cent or 8.5 mills. In the case of steam for power turbines, a steam price of 40 cents per 1,000 lb. was used in order to keep the lines on the chart from overlapping with one another.

The cost of labor or supervision, maintenance, and investment is not included in the costs shown on the chart. The steam consumption of the turbines can be estimated from the water rates indicated as separate figures on the turbine lines of the chart. Very conservative costs (i.e. high costs) are shown on the chart because of the general and approximate way that the Process Costimating series will be used.

The power actually delivered to the liquids, gases, water, etc., is lower than the brake or driver horsepower shown on the chart by a correction for the mechanical efficiency of the pumps, blowers, etc. The efficiency of such equipment and the computation of the amount of power required will be discussed in Process Cost-imating No. 23 (August 18, 1958).

The amount and cost of the steam needed by reciprocating steam pumps was discussed in Processing Costimating No. 21 (July 28, 1958, p. 187).

Most of the equipments considered in the chart are for large power services. The only item that is needed in the 1-10-hp. range is electrical motors. Values may be estimated with fair accuracy by reading in the 10-100 hp. range and dividing by 10.

The cooling required for diesel engines and small high-speed gas engines is about 3,000 B.t.u. per b.hp. More cooling is required for large gas engines (4,000 B.t.u. per b.hp.) and even 5,000 B.t.u. for those with double-acting pistons.

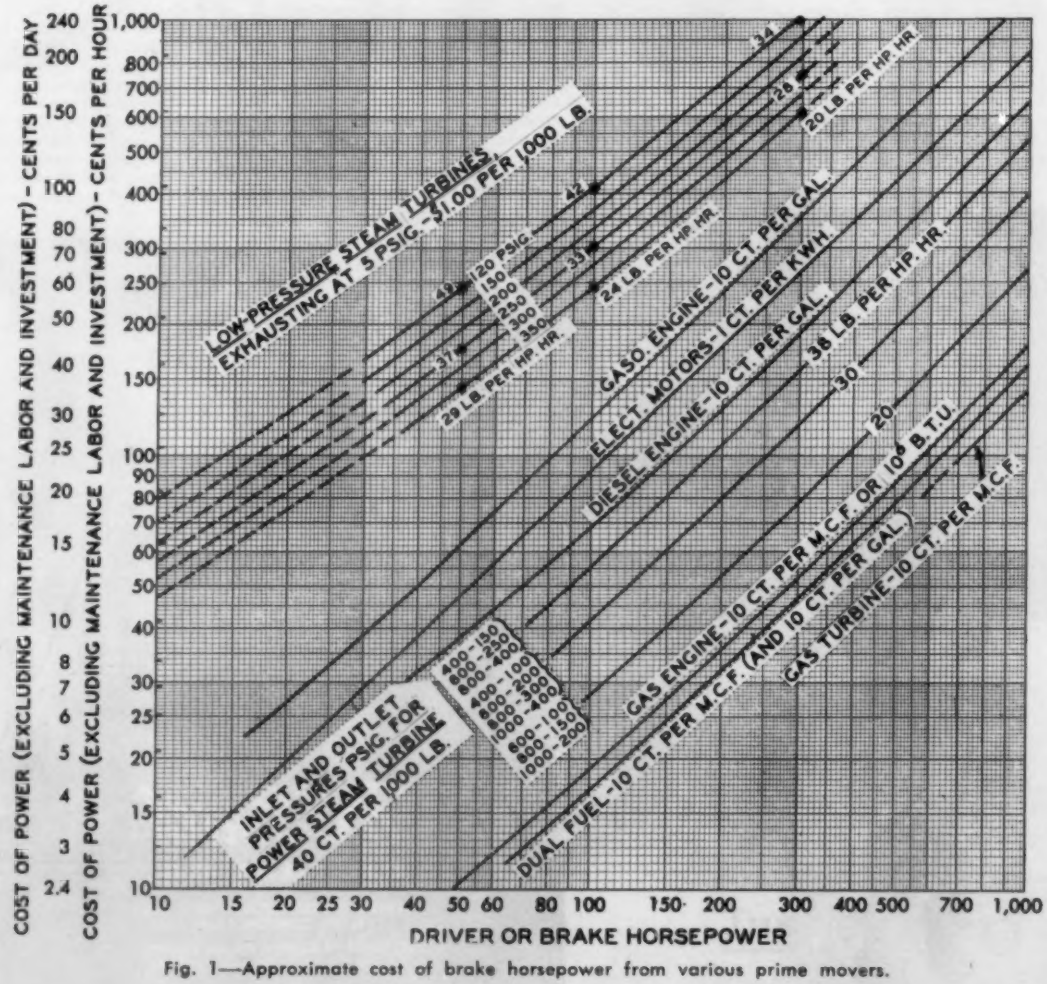


Fig. 1—Approximate cost of brake horsepower from various prime movers.

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with "every bit the best"
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OIL TOOL CO.
GENERAL OFFICES, EXPORT OFFICES AND PLANT: COMPTON, CALIF.
BRANCHES IN ALL PRINCIPAL OIL CENTERS IN THE UNITED STATES AND CANADA

▶▶▶ Among the Drilling Contractors

TURBODRILL operations of Moran Drilling Co., Wichita Falls, Tex., on the big Herscher structure near Kankakee, northeastern Illinois, where Moran is putting down a series of gas-storage wells for Natural Gas Storage Co. of Illinois (OGJ, July 28, 1958, p. 108), occupy attention of this group. Shown in front of Moran's turbodrilling rig are, left to right: W. R. Clark, district geologist, and R. W. Oborn, district drilling superintendent, Natural Gas Storage Co. of Illinois; J. W. Hancock, drilling superintendent, Natural Gas Pipeline Co.; O. C. Davis, general superintendent of storage for the gas-storage company; R. J. Moran, president of the contracting company; and Madden Works, operations manager, Turbodrill Division, Dresser Industries, Inc. Moran is using two light rotary rigs on the 10-well program, this one using the Dresser-sponsored turbodrill, and the other conventional tools. Wells are to depths of 2,400 to 2,600 ft.

THIS CREW mans Moran Drilling Co.'s turbodrilling rotary rig on the Herscher underground gas-storage project in Illinois. Dale Erwin, at the top, is tool pusher. Below him, in order, are: Gene Whisenhunt, H. O. Robertson, C. L. Webster, floormen; and Don Fatheree, driller. This rig has been able to cut well time on the 2,400-2,600-ft. holes to 10 days as against about 30 days for the conventional rotary used by Moran on the same project.

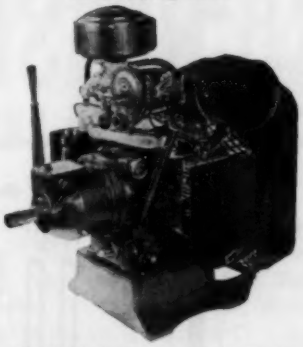
Who's getting the drilling contracts

Golden Meadow Well Service Co. will drill W. W. F. Oil Corp.'s second well in the new East Buhler field, 6 miles northeast of Lake Charles, in Calcasieu Parish, southwestern Louisiana. **Delta Drilling Co.**, Tyler, Tex., drilled the discovery well, completed in June with gas-condensate production from an 8,790-ft. sand. The second well, 1 Hackett-Edgewood Unit 1, is 3,350 ft. east of the discovery. It is set up as a 10,000-ft. test.

Atlas Drilling Co. has a new contract operation scheduled for Tidewater Oil Co. in eastern Vermilion Parish, Louisiana Gulf Coast. It will

WIND WHEEL ENGINE

For Pumping Units



The Oil Field has proven it to be an economical, long lasting engine.

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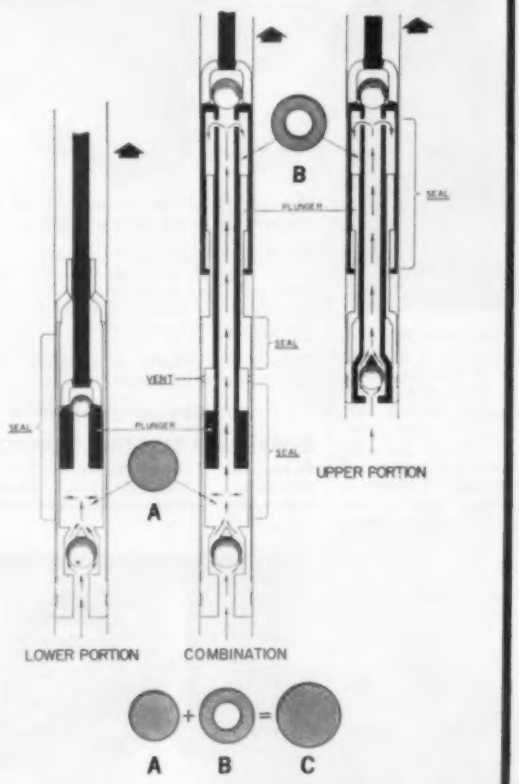
NEW AXELSON VOLUMAX INCREASES PRODUCTION FLOW



Shaded circles indicate volume areas. Plunger area (A) plus annular area (B) result in increased production area (C).

Axelson's new Volumax pumps will outperform any similar pump currently available for 2" tubing.

Special ⅞" liner column uses ⅞" plunger to effectively seal and create an upper telescoping annulus. Resulting production is 22% more than that obtained with a tubing pump.

Lower portion plunger area (A), plus upper portion annulus area (B), combine to provide increased volume (C).

ALL VOLUMAX PUMPS PROVIDE THESE ADVANTAGES:

1. Volumax pumps may be operated at a depth limited only by sucker rod stress.
2. Tandem pump construction provides extreme rigidity of all parts during compression portion of stroke (downstroke).
3. Maximum fluid passage — minimum drag.
4. Optimum plunger fits established through practical field experience.
5. Exceptionally good hold-down ability.
6. An insert pump, tubing need not be pulled.

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ROCKY MOUNTAIN: Jones and Laughlin Steel Corp., Supply Division, Tulsa
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CANADA: Jones and Laughlin Steel Sales Co., Ltd., Supply Division, Calgary
Dominion Oil Fields Supply Co., Ltd., Calgary

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be a 12,800-ft. test. Location is about 3 miles northeast of gas production in the Erath area. It is listed as 1 Broussard Unit B-10, in 1-13s-4e.

Hunt Drilling Co., Corpus Christi, has a new wildcat operation 10 miles east of Midway, in Matagorda County, Texas Gulf Coast. It is a contract job for Christie, Mitchell & Mitchell, of Houston, with Hunt having an operating interest in the project. Location is at 1 Derrick, in the R. Lawder Survey. It is 3 miles northwest of Harrison field, nearest production. Plans call for a 10,000-ft. test.

Trend Drilling Co. will be the contractor on Humble Oil & Refining Co.'s new wildcat test in northern Refugio County, Central Texas coastal area. Humble's location, at 1 Shay, in the J. Power & J. Hewitson Survey, is about 6 miles north of Vidauri, near the Victoria County line. It is a 7,500-ft. test.

C. J. Foster Drilling Co., Richmond, Tex., has a rig running on a wildcat location 5 miles north of Bender field, in southern Montgomery County, Texas Gulf Coast. It is a contract operation for Dolphin Production Corp. at 1 Randon Porter, in the John Taylor Survey.

Sterling Drilling Co., Sterling, Kans., is drilling on a new wildcat test on the Chadron arch in Cherry County, northwestern Nebraska. Motex Oil Co. is the operator. Its location is at 1 Saults, in 12-29n-37w. Hole will be carried to granite, expected at 4,600 ft.

Sunnyland Contracting Co., Rayne, La., has contracted for a 11,100-ft. well to be drilled in the Southeast Gueydan area of northwestern Vermilion Parish, Coastal Louisiana. William J. Seidl, of New Orleans, is the operator with location at 1 Hardee, in 15-12s-1w. Location is northeast of the field's two gas wells, drilled by Pure Oil Co.

Power Rig Drilling Co., Lafayette, La., has been given the contract on another well Sunray Mid-Continent Oil Co. is scheduling for the new West DeQuincy area in southwestern Beauregard Parish, southwestern Louisiana. Sunray Mid-Continent opened the field last December with oil production from a 9,400-ft. Cockfield sand, and now is nearing the pay zone at its first confirmation attempt, north of the discovery well. The new operation, 4-B Lutcher - Moore, is about 1½ miles southwest. It has a 10,300-ft. permit.

Holmes Drilling Co., Houston, has gone in with Midwest Oil Corp. on a wildcat drilling venture in southeastern Jackson County, central coastal area of Texas. A Holmes rig will put down the test, scheduled to go to 9,100 ft. to look at all the known lower Frio and Vicksburg producing zones in adjacent fields. Location, at 1 King, is about 3 miles northwest of Francitas and about 2 miles west of North Francitas field, nearest production.

Clegg & Hunt, Houston, will drill a 10,000-ft. northeast extension test in the Cowards Gully field, west of DeQuincy, in northern Calcasieu Parish, southwestern Louisiana. It is a contract operation for Tennessee Gas Transmission Co. The new location is for 1-C Lutcher-Moore, in 14-7s-11w.

Dixie Drilling Co., Houston, has a new deep-drilling job in coastal Terrebonne Parish, Louisiana. It is for Union Oil Co. of California with location at 1-S L. L. & E., in 36-19s-14e. Location is in the tidal marshes bordering the west end of Lake Decade, and about 3½ miles southeast of Lake Decade field. Permit is for a 13,500-ft. test.

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This week's SHOWCASE features . . .

New factory-applied color coating

. . . costs less than paint and is more durable, the maker reports. It's used with preengineered steel buildings. Colors offered include blue, green, bronze, rose, gray, and white, as well as the standard metal finish.

Called Stran-Satin Color, it's not a paint, but a two-layer protective coating of vinyl-aluminum that is said to be more durable and lower in cost than paint. It's applied to the galvanized-steel panels at the factory.

The makers say that test samples have withstood rigorous, continuous exposure tests with no deterioration of the finish coat, no loss of adhesion, and no corrosion of base metal. Also, it is said that the new color coating will not blister, peel, or crack. Tests equal to 7 years of sunlight showed no color fading—in fact, a slight intensification of color is apparent with aging. **Write or call: Stran-Steel Corp., Unit of National Steel Corp., Detroit 29, for details on Stran-Satin Color.**

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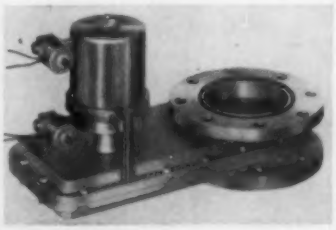

Valve operator works fast

. . . to open or close a valve. It can effect a 180° turn in a fraction of a second, the maker claims. Linear motion is converted into rotary motion with high torque in the new remote-control device. Linear movement of a guided plunger along a spirally fluted shaft in a pneumatically operated cylinder effects the 180° shaft rotation. The cylinders are simple and compact.

Two models are currently available. Both operate at the air pressures available in most plants. They can be operated at pressures down to 50 psi.

Manual operation is permitted if power fails in systems based on electrically operated valves. The same feature permits manual control if air pressure fails. The device can be wired to effect automatic, instant closing or opening. **Write or call: Vacuum Research Co., 420 Market Street, San Francisco 11, for details on valve remote control.**

●

Flow indicator range adjustable

. . . in the field. The indicator makes a simple, reliable safety signal. It shows at a glance if flow is taking place. It's clearly visible from a distance, even in a bad light. A chromium-plated ring spins under a toughened glass dome. It provides definite movement which precludes a chance of misreading, the maker claims.

The indicator can be useful where water or oil circulates. Specific applications are cooling water to compressors, condensers, engines, and jacketed vessels; and lubricating oil to bearings or gear trains. It's available with a die-cast brass body in ½, ¾, and 1-in. pipe sizes for flows from 0.72 to 24 g.p.m. Other models are available for flows from 0.075 to 120 g.p.m. in pipe sizes to 3 in. **Write or call: McIntosh Equipment Corp., Walker Crosweller Div., 15 Park Row, New York 38, for details on flow indicators.**

Send this **Showcase Coupon**

to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

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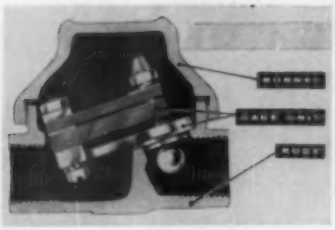
and PETROLEUM PANORAMA will be coming. Free. Early in 1959. To every subscriber of The Oil and Gas Journal. It's a 100-year history book of the technical advances of oil and gas.



Small steam trap for traced lines

. . . and instrumentation service has only three parts—cover, body, and cage. The cage consists of a bimetallic element, holder, ball valve, and stellited seat. This unit fits in the body and is held by two screws. In a few minutes, a new cage can be installed.

The new midget trap performs four functions—traps steam, vents air, discharges condensate, and acts as a check valve.

Operating without chatter, the trap gives positive closing on steam, works against any back pressure in all positions, and is unaffected by waterhammer. Pressure ranges are 0 to 50 and 0 to 200 psi. **Write or call: Velan Steam Specialties, Inc., 37 South River Street, Plattsburgh, N. Y., for details on new midget steam trap.**

COOLING TOWER INSTALLATION

In the typical cooling tower installation shown above, the motor — outside the humid or corrosive atmosphere — is connected by a floating-shaft coupling to the gear box under the large slow-speed, horizontal-blade fan.

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Thomas Couplings are used to advantage on Pumps, Compressors, Cooling Towers, Rigs or any other tough job where continuous operation and dependability are required.

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings.

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2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY
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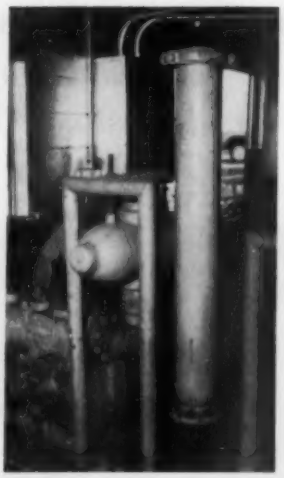


New liquid flow stabilizer

. . . developed for the suction and discharge ends of reciprocating pumps and for loading racks for tank cars and trucks. The device can be useful to stabilize flow of pumps in secondary-recovery projects and crude-oil gathering systems, including automatic-custody-transfer units, according to the maker.

By stabilizing the pump suction and discharge pressure, it can eliminate the danger of cavitation, valve-spring leakage, and piping vibration. At the same time, it will increase pump efficiency and permissible pump speed.

A vulcanized, sealed air chamber backed by corrosion-resistant bands prevents precharge loss. The diaphragm is constructed to give instant response. The membrane is made of synthetic rubber and reinforced with nylon to assure long life. A two-bolt cartridge type of chamber allows fast servicing in the field by unskilled personnel. Little servicing is required. **Write or call: Pulsation Engineering Co., P. O. Box 4396, Station A, Dallas, for details of flow stabilizer.**

●

Rodless hydraulic bottom-hole pump

. . . comes in 3 and 4-in. sizes for use where increased production is desired. The 3-in. size with a 59-in. stroke operates any API production pump in sizes of 1½, 1¾, 2¼, and 2½ to produce from 419 to 1,160 bbl. per day. The 4-in. model, also with 59-in. stroke, operates 2¼, 2½, and 3¼ API production pumps for production displacement from 940 to 1,960 bbl. per day. This design has been in field operation for more than a year.

Testing Time Saver...

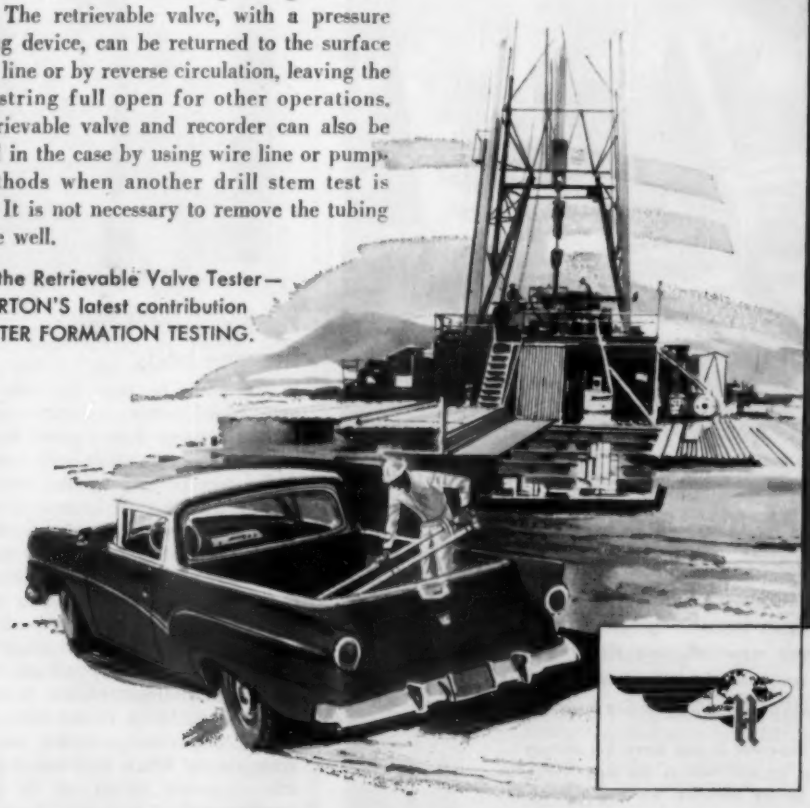
HALLIBURTON'S ONE TRIP
RETRIEVABLE VALVE TESTER

Reduced rig time during well evaluation and completion operations results when you include Halliburton's Retrievable Valve Tester in your string. Used above the RTTS Packer, the Retrievable Valve Tester permits several operations such as drill stem testing, cement squeezing, treating, perforating and simultaneous gamma-collar logging without the usual time-consuming round trips with tubing between operations.

30 SECOND TECHNICAL DESCRIPTION

This versatile testing tool consists of two assemblies—the retainer case and the retrievable valve. The case is run in the tubing string with the packer. The retrievable valve, with a pressure recording device, can be returned to the surface by wire line or by reverse circulation, leaving the tubing string full open for other operations. The retrievable valve and recorder can also be replaced in the case by using wire line or pumping methods when another drill stem test is desired. It is not necessary to remove the tubing from the well.

Specify the Retrievable Valve Tester— HALLIBURTON'S latest contribution FOR BETTER FORMATION TESTING.



RETAINER CASE & RETRIEVABLE VALVE TESTER

HALLIBURTON OIL WELL CEMENTING COMPANY DUNCAN, OKLAHOMA

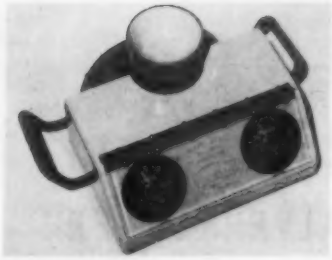
TESTING SERVICES

HALLIBURTON—SETS THE PACE IN DRILL STEM TESTING

SHOWCASE . . .

New Equipment

The pumps are of rugged, yet simple construction. The hydraulic unit operates the bottom-hole production pump. A wide choice of metals is offered to meet various field conditions. Large engine-valve partings protect against clogging. **Write or call: Sargent Engineering Corp., 2533 East Fifty-Sixth Street, Huntington Park, Calif., for details on 3 and 4-in. rodless hydraulic bottom-hole pumps.**



Indicator gives data on rigging

. . . conditions to prevent pole mast or derrick failures. The Safety-Weigh control indicator indicates (1) guyline loads and changes, (2) pipe-mast or portable-derrick foundation loads and changes, (3) wind loads on portable derricks, (4) load on rods when pulling stuck pumps, (5) load on swab line, and (6) load on tubing pulls.

The instrument sets under the pole or derrick-mast adjusting screw and on the mast foundation, taking the place of the conventional steel base plate.

It is made either as a contained unit for observation at wellhead or with remote indicator for platform operators. It can also be furnished with a timing device to record surge loads on the indicator. **Write or call: Pennant, Inc., Box 3656, Tulsa, for details on Safety-Weigh control indicator.**

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A Thompson Separator is your surest bet onshore . . . offshore . . . for shallow, medium and deep wells. The dependable Sample Machine works simultaneously with the separator, giving a foot-by-foot mud analysis with specimens. Write for Folder.

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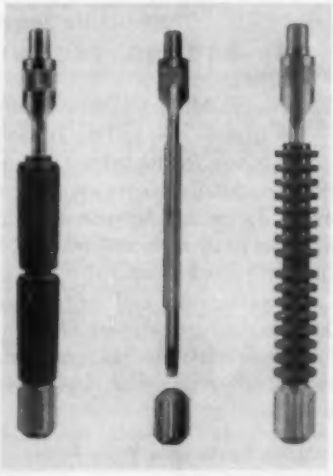

Tubing swab rubbers fit same body

. . . in new line now available. The new swabs come in both cup and multidisk types. For a particular tubing size, only one swab body is needed and a pair of each of the two types of rubbers. This allows you to handle any kind of tubing swabbing job.

Extensive field tests show the new BJ swabs can put considerable fluid in a tank fast and with few rubber replacements, the maker reports.

Designed for flexible operation, the rubbers automatically adjust to the load. To minimize friction wear and to speed the drop to the bottom, the swabs allow an annular clearance going down. When the swab is pulled, this clearance closes up to give a positive seal.

In the cup type of swab, the cup is covered with a thick layer of tough, synthetic rubber. And it is made up of a series of vertical steel wires encircled by two steel reinforcing rings —one at the middle and one at the

bottom. The one at the midsection is the load-compensating ring on which the wires pivot and adjust to allow the least amount of wall friction needed to form a positive seal when a load is being pulled.

The disk type of rubber is designed for effective pulling of sand-laden fluids or for general-purpose swabbing where an overload feature is desirable. Going in the hole, the 16 beveled-edged disks that make up the two rubbers sweep upward to speed the swab's descent. Coming out of the hole, the swab's Venturi action pulls the disks out against the tubing wall with the right pressure to hold the load. If the swab becomes overloaded, the disks automatically release fluid until equilibrium is restored. **Write or call: Byron Jackson Tools, Inc., subsidiary of Borg-Warner Corp., P. O. Box 2017A, Terminal Annex, Los Angeles 54, for details on BJ tubing swabs.**

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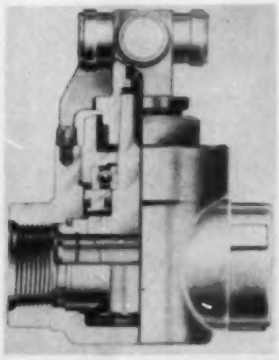


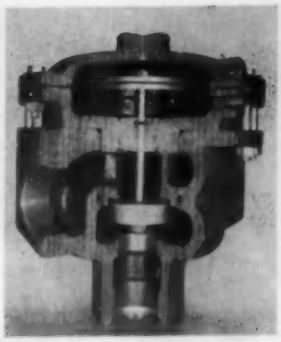
Nonlubricated plug valve

. . . with full-opening round port is designed for the control of water, salt water, oil, gas, drilling fluids, cement, acid, air, and fracture fluids.

Suited for pressure or vacuum, it combines the nonlubrication feature with free-floating, self-aligning, pressure-sealing seats. It meets the exacting requirements of high-pressure service with bubble-tight sealing, easy operation, quarter-turn opening and closing, and low maintenance, the maker says.

A special feature of the valve is its self-cleaning action. When the valve is at the half-open position, a flow is established in all the clearance areas that completely flushes out any material that may be trapped there.

The valve is available in sizes from 1 through 4 in. End connections include flanged, screwed, Weco, Grayloc, Unibolt, and welded. **Write or call: Texsteam Corp., P. O. Box 9127, Houston 11, for details on Graham plug valve.**



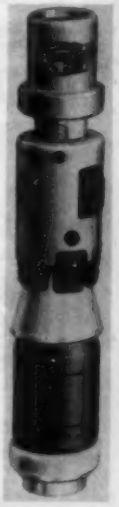
Motor valve for lease automation

. . . features a 2-in. size and three-way, two-position construction. It is tested to 150 psi. All working parts are removable without disturbing the piping. The body and inner valve parts are corrosion resistant. Molded Hy-Car seating surfaces insure a positive seal.

Called the Enardo P-1100, the valve is a convenient means of automatically switching and testing wells, the maker says. It will control flow into and out of metering vessels, separators, treators, or tanks. Or it will divert fluids from one incoming line to either of two outlets. **Write or call: Enardo Mfg. Co., 2729 Sand Springs Road, Tulsa, for details on Enardo P-1100 motor valve.**

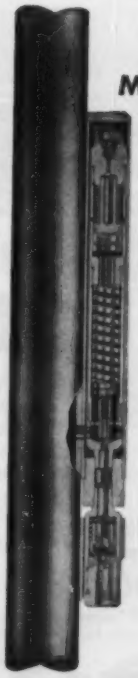
●

Short-tension packer eases redressing



. . . and assures positive setting and quick release, the maker claims. It's designed for use in water flooding, acidizing, fracturing, and other below-packer pressure applications. One feature is a safety-joint coupling that has a right-hand release, eight-round thread. The anchor gage is of one-piece malleable iron. It makes a solid tie between the J-slot, gudgeon pin, and friction pads and allows independent slip suspension.

The mandrel is in one piece and made of seamless-steel tubing. The friction pads are heat-treated, pearlitic malleable iron with locked-in coil springs. The slips are heat-treated alloy steel, held in retracted position by a stainless-steel spring. **Write or call: Guiberson Corp., P. O. Box 1106, Dallas, for details on short-tension packer.**



CM2-FS

TIME TESTED MACCO GAS LIFT

MACCO "SPRING" FLUID OPERATED VALVE

("No Charge" Bellows)

In this type valve, with no bellows charge, the spring tension is set as the valve opening pressure. The bellows functions only as a diaphragm, and the spring functions as the total actuating force. When once a valve opening pressure is set by spring tension, the pressure remains unchanged regardless of hydrostatic pressure or temperature applied to the valve in the well. Since the spring in this valve is the total actuating force, the valve may be set with either extremely low or high opening pressure (100-3000 psi). On the "SPRING" fluid operated valve, the spring tension keeps the valve closed until a desired predetermined head of fluid has entered the tubing.

Macco "Spring" Fluid Operated Valves are manufactured in two sizes. The CM2-FS Valve is 1½" diameter for all normal installations. The CM-1FS Valve is 1" diameter and has wide application in dual, macaroni, and slim-hole lifting.

For further information regarding lifting with Macco Fluid Operated Valves, write for Brochure No. 3-12.

MACCO OIL TOOL COMPANY, INC.

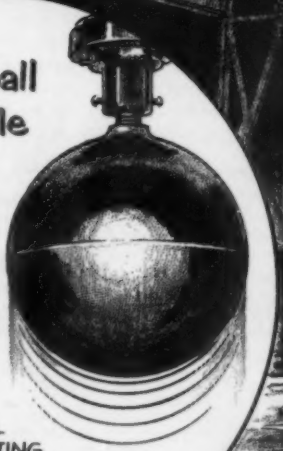
1521 Prince P. O. Box 7288 Houston 8, Texas

Phone UN 1-1253

FIELD FACTS

"GHOST" WELL Comes back to LIFE!

4200 FT SOUR WELL IN WEST TEXAS WAS GOING TO BE ABANDONED BECAUSE THE HIGH-SULFUR CRUDE WAS CORRODING OUT THE PUMPS TOO FAST. THEN, THE OPERATOR USED A MONEL* NICKEL-COPPER ALLOY PUMP. IT BROUGHT THE WELL BACK TO LIFE! HE OPERATED THE WELL FOR 18 MONTHS, UNTIL IT RAN DRY. THREADS AND WORKING PARTS WERE STILL IN EXCELLENT SHAPE WHEN MONEL ALLOY PUMP WAS REMOVED.



"Bouncing" ball doesn't dribble

FLOAT VALVES, MADE OF MONEL ALLOY FOR AN OIL COMPANY OPERATING IN THE SOUTHWEST, ELIMINATED SLOW DRIBBLE OF VALVES IN AIR ELIMINATOR SERVICE. VALVES WERE EXPOSED TO SOME OF THE MOST CORROSIVE CRUDE IN TEXAS. MONEL ALLOY RESISTS OVER-ALL CORROSION AND PITTING AT ORIFICE INTERFACES, PREVENTING LEAKAGE.

Spring never "Sprung"

AFTER 104 DAYS EXPOSURE TO CRUDE IN A PARTICULARLY SOUR WELL, MONEL ALLOY BROUGHT OUT THIS STANDING VALVE ON FIRST PULL. THE STEEL CROWN WAS BADLY CORRODED... BUT THE MONEL ALLOY SPRING WAS STILL IN TIPTOP CONDITION.

STUMPED BY A METAL PROBLEM?

A CHAT WITH INCO'S MECHANICAL OR CORROSION ENGINEERING SECTION MAY HELP. FOR DETAILED INFORMATION ON INCO NICKEL ALLOYS IN OIL PRODUCTION USES, WRITE FOR "METALS TO MAKE PETROLEUM PRODUCTION EQUIPMENT PRODUCE MORE."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street — New York 5, N. Y.

INCO

*Registered trademark

INCO NICKEL ALLOYS

SHOWCASE . . .

New Literature

123 custom-made bolts, nuts, studs, and screws

. . . for industrial use are illustrated in a new 12-page brochure. They are representative of the many different types of special fastenings made-to-order by this company. The booklet also details a complete stock of milled cold-rolled carbon-steel studs. **Write or call: Victor Products Corp., 2635 West Belmont Avenue, Chicago 18, for Custom Fastenings brochure.**

Materials for making

. . . process flow charts, as well as other charts and layouts used in business and industry, are reviewed in a series of new manuals. The five manuals available are entitled: "Statistical Charting," "Office Layouts," "Plant Layouts," "Organization Charts," and "Process and Flow Charts." Each manual includes facts about the Graph-A-Plan system for quick and easy construction of charts and layouts. **Write or call: Labelon Tape Co., Inc., 450 Atlantic Avenue, Rochester 9, N. Y., for Graph-A-Plan manuals.**

Logging and perforating

. . . tools and services of Perforating Guns Atlas Corp. are covered in new Catalog 5859. The comprehensive catalog fully illustrates and explains the operating techniques for a number of logging and perforating instruments, tools, and services. These include perforating guns, nuclear and electrical logging equipment, caliper surveying, making permanent type of well completions, sidewall sample coring, fluid sampling, and wire-line equipment. **Write or call: Perforating Guns Atlas Corp., 7730 Scott Street, Houston, for Catalog 5859.**

Coupling-tapping machine

. . . is described in new 12-page Bulletin E-98-1. The machine's designed for high-production precision internal threading of oil tubular couplings, conduit, reamed and drifted, merchant, and special couplings. The bulletin describes the machine's design features in detail. A large chart covers the specifications. **Write or call: Landis Machine Co., Waynesboro, Pa., for Bulletin E-98-1.**

Tanker loading arm

. . . that's hydraulically controlled is described in new eight-page Bulletin 258. The bulletin shows installations and contains general specifications. **Write or call: Chiksan Co., Brea, Calif., for Bulletin 258.**

High-vacuum vapor pumps

. . . are comprehensively covered in new 68-page Bulletin 6-1. The bulletin tells you about vacuum pumps, pump supplies, and accessories. The handy booklet is easy to read, and charts, graphs, and diagrams graphically describe each item. It's punched for notebook insertion. **Write or call: Consolidated Electrodynamics, Rochester Div., Rochester 3, N. Y., for Bulletin 6-1.**

Well logging

. . . is one of the potential applications for positive ion accelerators described in a new six-page folder now available. It describes the Cockcroft-Walton accelerator that generates thermal neutrons for chemical analysis and for production of short-lived radioactive tracers. The unit generates fast neutrons for analysis by excitation of characteristic gamma rays. The folder includes graphs showing neutron yields and energies. And it discusses a number of applications. **Write or call: Applied Radiation**

ROCKFORD

OIL FIELD TYPE

LONG LIFE
Heavy-Duty

POWER TAKE-OFF

Once-a-Year Lubrication

- Eliminates the Pilot Bearing
- Release and Main Bearings are lubricated for one year.
- Main Bearings are 40,000 hour type
- Handles 5,000 pound Belt Loads
- Out-Board Bearings and Flexible Couplings eliminated
- Furnished with Single or Double Plate, Organic or Morlife® faced Gear tooth Type Clutches

Insure longer work life and reduce down-time with this NEW extra heavy-duty ROCKFORD POWER TAKE-OFF.

BW SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER
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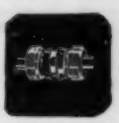
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

Small Spring Loaded

Heavy Duty Spring Loaded


Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

CLUTCHES

Corp., Walnut Creek, Calif., for folder on Cockcroft-Walton accelerators.

Slings and fittings handbook

. . . features new reference information condensed into handy chart form on sling types, dimensions, and rated loads. The fully-illustrated 40-page booklet covers more than 80 subjects. This is the third edition of the popular handbook. **Write or call: Union Wire Rope Corp., 2100 Manchester Avenue, Kansas City 26, Mo., for Form SL-3.**

Low cost, precise metering

. . . of liquids and steam, air, or gases is detailed in new six-page Bulletin 100-R1. One meter, called Propeloflo, for liquids comes in sizes from 2 in. and larger. It totalizes flow by means of a propeller which rotates at a speed exactly proportional to the flow rate and reads directly in gallons, cubic feet, barrels, or other units. The Shunt-flow meter is a turbine-actuated totalizing flowmeter for steam, air, and gases with deflected flow turning a rotor at speeds proportional to flow rate. **Write or call: Builders-Providence, Inc., 345 Harris Avenue, Providence 1, R. I., for Bulletin 100-R1.**

Prefabricated insulation fittings

. . . are outlined in a new four-page folder. The Uni-Fittings described in the brochure are for ell, flange, and valve fittings. Physical composition of the product, temperature range, sizes, and prices are covered. **Write or call: Aber Co., Inc., P. O. Box 2535, Houston 1, for insulation-fittings catalog.**

New flow-regulating valve

. . . that uses a horizontal rotating-lever shaft instead of a sliding stem and is accurately balanced in service is described in new two-page Bulletin 1053. The bulletin illustrates these features and other valve characteristics. It gives specifications on sizes, pressures, and materials of construction. **Write or call: Copes-Vulcan Div., Blaw-Knox Co., Erie 4, Pa., for Bulletin 1053.**

Data-processing system

. . . called Model 123 by Beckman Systems Div. is detailed in new four-page Bulletin 3014. The 123 system is a standard, 100-channel data logger, featuring pinboard programing and all solid-state construction. The system is suited for process and power plants, pilot operations, or whatever variables such as temperature, pressure, and flow are to be recorded. **Write or call: Beckman Systems Div., 325 North Muller Avenue, Anaheim, Calif., for Bulletin 3014.**

Field measurements of process variables

. . . made locally and/or remotely can be received and displayed in digital form by the Metrotype information system. The system is illustrated in new eight-page Bulletin E72-1. The data-gathering equipment may be obtained as part of a complete system, or may be used with existing primary measuring devices. **Write or call: Bailey Meter Co., 1050 Ivanhoe Road, Cleveland 10, for Bulletin E72-1.**

Electrical equipment

. . . is described in new 12-page pictorial Bulletin 2706. The bulletin graphically features the manufacturing facilities of the company. It also features examples of installation of Condulets and floodlights in a variety of applications. **Write or call: Crouse-Hinds Co., Syracuse 1, N. Y., for Bulletin 2706.**

"Is there something wrong, Walpoole—you've been avoiding me lately."

THE OIL AND GAS JOURNAL

D&S TRUCO

TRI-DIA

DIAMOND BITS

for fastest diamond drilling

- Eliminates sticking hazard from mud wall cake.
- Permits washing out large pieces of junk iron, minimizing that hazard.
- Readily washes out cavings to bottom.
- Eliminates swabbing, hydraulic action when making trips.
- Designed for safety.

TRUCO DIAMOND BITS

Drilling & Service INC.

DIAMOND DRILLING EQUIPMENT

6210 NORTH CENTRAL EXPRESSWAY | DALLAS, TEXAS

OFFICES IN ALL PRINCIPAL OIL AREAS

Ultra Fine Diamond Equipment for the Oilfield

REFINERY SUPPLY COMPANY

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2215 McKINNEY AVENUE, HOUSTON 3, TEXAS

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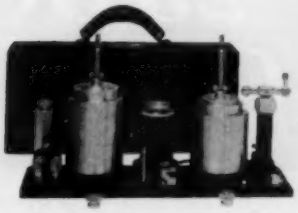
621 EAST FOURTH STREET, TULSA 3, OKLAHOMA

Detroit, San Francisco, Santa Clara, Los Angeles, Toronto, Montreal, Vancouver, Ottawa

CENTRAL SCIENTIFIC COMPANY

R.S. PORTABLE DEAD WEIGHT TESTER

for accurate testing of high pressure up to 5,000 psi

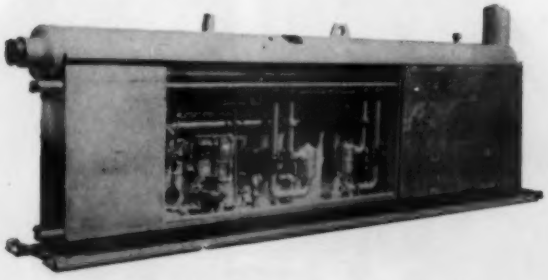


The only truly portable dead weight tester of this capacity

An extremely compact instrument for pressure gage testing and calibration to pressures of 5,000 psi. Standard Accessories include an adaptor so the tester may also be used as a dead weight gage. Can be furnished in ranges of 5-1000 psi or 50-5000 psi.

PETCO

DEHYDRATION UNITS



* Packaged-Portable
* Fully Winterized
* Maximum Liquid Recovery
* High Dew Point Depression

PETCO, the efficient, low cost dehydration unit for every gas drying job in every location. ALSO manufacturers of Verti-Flow Separators, and Scrubbers with PETCO Permeable Plastic.

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For Cathodic Protection.. only ZINC ANODES

Have Long Life and are Self-Regulating

Unlike other metals sometimes used for cathodic protection, zinc anodes have an expected life of a minimum of fifteen years. Zinc anodes are self-regulating and require no current regulating resistors to meet the load demand, whether high or low.

These are important reasons why American Zinc Anodes are first choice for cathodic protection in the oil and gas industry. Your inquiries invited.

Manufactured by:

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HOUSTON, TEXAS • TULSA, OKLA. • NEW ORLEANS, LA.
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35 to 25,000 GPM/LP*

The petroleum industry's use for and need of water for operations, process consumption or heat transfer is met by Layne Vertical Turbine Pumps.

Whether the supply or the demand calls for a 4 inch well or any size up to 42 inches, Layne Pumps are designed and engineered to deliver the required GPM economically and unfailingly.

Pioneers and acknowledged leaders in the field of water, Layne produces pumps designed to meet multiple service requirements efficiently and economically.

*/LP—Per Layne Pump

LAYNE & BOWLER, INC., **MEMPHIS**
GENERAL OFFICES AND FACTORY • MEMPHIS 8, TENN.
LAYNE ASSOCIATE COMPANIES THROUGHOUT THE WORLD

Layne

WATER WELLS • VERTICAL TURBINE PUMPS
WATER TREATMENT

To: Layne & Bowler, Inc.
Memphis 8, Tennessee

Gentlemen: Please send me bulletin No. 100.

*Name*_____

*Title*_____

*Organization*_____

*Address*_____

*City*_____ *State*_____

C-R-C promotes four officers

... reports A. S. Crutcher, president of Crutcher - Rolfs - Cummings, Inc. Kenneth Defenbaugh, previously a partner in an Oklahoma City company

K. Defenbaugh

C. E. Hatcher

which supplied certain equipment to C-R-C, has assumed office as vice president and general manager. C. E. Hatcher, in charge of the internal pipe

Jack Scott

W. C. Cherry

coating division, has been made a vice president. Jack Scott, who previously served as sales and service manager, is the new vice president in charge of sales and service. W. C. Cherry, formerly chief accountant and comptroller, is promoted to the secretary-treasurer post.

Griscom-Russell Co. awarded

... a contract for the design and manufacture of a record size air-cooled heat exchanger by Esso Nederland N.V., The Hague, Holland. It is scheduled for operation in early 1960. The G-R fin fan exchanger will be used in the refinery's cooling services for such units as the atmospheric pipe still, the gas oil Hydrofiner, Powerfiner feed splitter, and the Powerformer. It will provide a total of 2,590,000 sq. ft. of cooling surface. The units will cover more than ½ acre of ground.

Oilwell announces two changes

... according to C. H. Maynard, eastern area manager of Oil Well Supply Division, U. S. Steel Corp. Ray L. Parrish, area manager, refinery and pipeline equipment sales, transfers from Calgary, Alta, to Chicago. Frank C. Nuhfer has been appointed area engineer at Columbus, Ohio. Parrish joined Oilwell in 1948 as district engineer, refinery and pipeline equipment sales; and Nuhfer joined the division in 1935 at Oil City, Pa.

C. R. Bootz named manager

... of Black, Sivalls & Bryson, Inc.'s controls division, Tulsa, according to K. W. Lineberry, president. Bootz will be responsible to the executive vice president for all phases of the division's operations which include a manufacturing plant at Tulsa. He has been with BS&B 2 years as manager of the nuclear project at Tulsa. Prior to joining the company he worked for Rand Development Corp., Cleveland, Ohio.

C. R. Bootz

Ernest A. Kiesler appointed

... to supervisor of Geophysical Service, Inc., operations in several western states, reports western operations manager Neil W. Mann. Kiesler will supervise GSI seismic and gravity field parties in the general area of California, Washington, Oregon, and Nevada. He will headquarter in Bakersfield, Calif. He joined GSI in 1936.

Parkersburg test runs

... one of the world's largest capacity pumping units at the Coffeyville, Kans., plant of The Parkersburg Rig & Reel Co. With a lifting capacity of 62,000 lb. and a maximum stroke length of 120 in., the unit base is 31 ft. 4½ in. long and 9 ft. wide. The height of the unit in midstroke is approximately 26 ft. This unit was designed especially for deep, heavy wells.

Otis Engineering Corp. reports

... several personnel assignments in several branches and in its home office in Dallas. Jack Russell has been promoted to assistant manager of field sales, Dallas. He will direct sales of gas lift tools and equipment. Johnny Wall has been named manager of the western division to succeed Russell. T. G. Garwood has been named domestic representative of the export department. E. E. Pearson has been promoted to assistant manager of the South Texas division in Houston. J. M. Barnes has been named sales engineer for the Farmington, N. M., area. K. W. Robbins was appointed Dallas office manager, in charge of administration for both domestic and export sales. Vernon Brown transfers from Corpus Christi, Tex., to Belle Chasse, La., and W. J. Hopson moves from Belle Chasse to Odessa, Tex.

Donald E. Graham named

D. E. Graham

... to the newly created position of executive vice president of H. C. Smith Oil Tool Co., according to Herschel C. Smith, president. Since 1956 Graham has been vice president and administrative assistant to the president and prior to that was vice president in charge of manufacturing. He joined the company 6 years ago.

Shell Chemical Corp. orders

... a high-volume flow mechanical drive turbine for compressor operation from General Electric Co.'s small steam turbine department for its Houston chemical plant. The turbine is rated 4,735 hp. and will operate at 8,580 r.p.m. Delivery of the unit is scheduled for late this year. It features a 360° nozzle ring to permit distribution of power to all the buckets simultaneously, reduces the number of high pressure joints, and eliminates the use of jumper pipes. Adaption of this nozzle ring permits it to act as a packing box to isolate high pressures from the front casing walls and reduce shaft span.

National Tube Div. installs

... new equipment for upsetting ends of specialty oil country tubing at the Ellwood City, Pa., works, reports William R. McCalister, general superintendent of the division of U. S.

Steel Corp. The 6-in. upsetter at the plant is one of the most modern in the industry. Elevating tables on the equipment make possible three forging passes on one heat compared to one pass allowed on the 5-in. upsetter it replaced. External or internal upset of tubing in a size range of 1.315 to 6-in. o.d. and up to 50-ft. lengths will be handled on the new line.

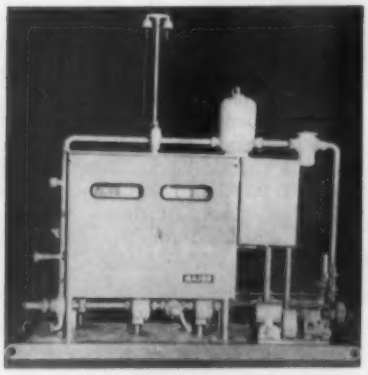
B. J. Fernandez joins

B. J. Fernandez

... Lago & Whitehead Advertising Agency's marketing research department. He was formerly with The O. A. Sutton Corp. and General Electric Co. in their market research organizations. In making the announcement Howard Whitehead, president, stated that the market research department was established under the consulting direction of Fernandez to serve business in the area with accurate market and research information.

Rainer Esslen transfers

... from Pittsburgh to the New York office of Ketchum, MacLeod & Grove, Inc. He is account executive in the public relations department. He joined the agency in Pittsburgh in 1953 to handle industrial and foreign trade publicity and promotion of the agency's clients.



Major Engineering Co. shows

... its new standard meter type automatic custody transfer unit to over 200 oil producing and pipeline companies operating and engineering personnel in Tulsa during a 10-day showing in June. The attendance record reveals visitors from Texas, Colorado, and Kansas as well as Oklahoma. The unit provides for an automatic daily check of the production meter by the check meter, automatic detection and recycling of bad oil, and automatic daily and monthly allowable controls where required.

Houston Nomads Hear Comdr. J. R. Lumby discuss

... the activities and the purpose of the International Geophysical Year. Bill Boren, Rolo Manufacturing Co., introduced the speaker and Ed Louden, president, presided. International guests who attended are, seated: R. M. Tufts, Socony Mobil Oil Co., Venezuela; N. E. Rieter, Jr., Reed Roller Bit Co., Middle East; Comdr. Lumby, Texas A. & M.; and Albert Crownover, Southeastern Drilling Co. of Iran. Standing are: G. Prias, Shell Condor, Colombia; M. L. Cooper, A-Z Export Co., Colombia; L. L. Johnson, Atlantic Refining Co., Syria; Noah Berry, Southeastern Drilling Co., Turkey; J. D. Haney, Southeastern Drilling, British Somaliland; Howard Archer, Southeastern Drilling, Turkey; and Kraus Earhart, The Texas Co.

Continental-Emsco Co. appoints

... William Storms as merchandise manager in Caracas, Ven., and Werner R. Rieter as export sales engineer in New York. Storms, as merchandise manager for Continental-Emsco Co. C.A., will have direct supervision of inventory and merchandise stocking for the three stores in Venezuela. Rieter will headquarter in the home office of the export division.

Foreign operations unit formed

... by Graver Water Conditioning Co., New York, division of Union Tank Car Co., with Jesse D. Crell as manager. He has been with the company for 6 years. The new department will work in conjunction with the international division of Graver Tank & Manufacturing Co., Inc., a subsidiary of Union Tank. Its function will be to expand the worldwide organization of representatives handling the complete line of liquid treatment equipment designed and manufactured by Graver. Expansion of foreign operations for the present will be made with particular emphasis on Central and South America.

Lucey Products Corp. elects

... W. O. Timberlake, manager of machinery, and Mrs. J. R. Mann, secretary, as directors. Timberlake was with Ideco Division of Dresser Industries, Cardwell Manufacturing Co., and Continental Supply Co. before joining Lucey in 1955. Mrs. Mann joined Lucey in 1957. She formerly served as a director and secretary of Toklan Oil Corp.

Milwhite Mud Sales Co. names

... Gilbert Pollard, sales manager, and R. A. Jung, manager of engineering, according to George E. Conner, executive vice president. Pollard

Gilbert Pollard

R. A. Jung

has been a member of the sales department of the company for the past 5 years. Jung has been with the drilling mud industry since 1942 and has acted in the capacity of engineering coordinator for the company.

Shipside rig-up speeds

... drilling equipment for foreign service from S&R Tool & Supply Co.'s new shipside rig-up yard at the Port of Beaumont, Beaumont, Tex., according to President George D. Conley, Houston. The new rig-up yard is serviced by 40-ton locomotive cranes for speedy rig-up, teardown, packaging, and loading for shipment. The combination of the new S&R Beaumont facilities with the S&R Houston rig-up yard and machine and fabrication shop offers the export-shipper of drilling equipment an economical and fast means of complete rig-up of all rig components whether new or used.

All over the world...

Rib-Top is the V-Belt drillers like best

New rig location...same Gates V-Belts
Drillers like the way Gates Rib-Tops stay on the job saving time and money — location after location.

It's a fact — more mud pumps are equipped with Rib-Tops than with any other V-belt.

There are good reasons: First, Rib-Tops are the only V-belts designed **specifically** for mud pump drives. They last longer. And that extra long life means real savings in belt replacement costs.

Yet — with these big advantages — Rib-Tops **cost no more** than ordinary belts of comparable ratings.

Use Super Rib-Tops on your toughest drives

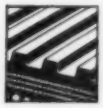
With 40% greater horsepower capacity, Super Rib-Top easily handles overloads. Fewer belts and narrower sheaves solve space and weight problems.

Both Standard and Super Rib-Top are available at your oil field supply house.

FREE Send for handy memo book containing data on Gates V-Belts and Hoses. Simply write: Oil Field Service

The Gates Rubber Co., Sales Div., Inc.
Denver 17, Colorado

No other V-belt has ALL these advantages



1. Stabilizing ribbed tops (U.S. Pat. 2548135) are exclusive with Gates. They dampen vibration, protect top of belt from damage, keep belt running smoothly over idler-equipped mud pump drives with no side whip.

2. Flex-Weave Cover (U.S. Pat. 2519590) A Gates exclusive: provides greater flexibility with far less stress on fabric. Cover wears longer . . . increases belt life . . . more power available to driven machine.

3. Concave sidewalls (U.S. Pat. 1813698) Concave sides (Fig. 1) increase belt life. As belt bends, concave sidewalls become straight, making uniform contact with sheave groove (Fig. 1-A). Uniform contact means less wear on sides of belt . . . far longer belt life.

4. Tougher, more resilient cords are able to absorb the severe pulsations of mud pumps; easily handle peak loads.

TPA 302

Gates — *The Mark of Specialized Research*

Gates Rib-Top Vulco Rope

DEVELOPED ESPECIALLY FOR MUD PUMP DRIVES

How to find Quality

and Service In Mud Pumps

Precision and skill of a proven manufacturer combined with the talents and know-how of a leading supply organization add up to two words . . . unexcelled service. That's the service assured by the appointment of Jones & Laughlin Supply Division as a distributor of Gardner-Denver mud pumps.

Gardner-Denver has a well deserved reputation in the oil fields as a top producer of **quality** mud pumps. Models range from 100 to 1250 hp with capacities and pressure ratings to meet any drilling requirement.

With these pumps and replacement parts available through the numerous Jones & Laughlin Supply Division stores in the United States and Canada . . . **service** is assured!

For complete information, contact your local J&L Supply store . . . office . . . or write us today, Drawer 2481, Tulsa, Oklahoma.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

J&L—A GREAT NAME IN SUPPLIES

How you can cut drilling costs with DRISCOSE

Driscose permits the drilled cuttings to be discarded over the shale shaker instead of being finely ground and contaminating the mud.

Driscose mud systems are trouble-free. Driscose muds are more stable and have better flow characteristics.

Driscose muds require less weight materials because of better suspension characteristics and less need for "watering back".

BEST BY TEST... DRISCOSE* HIGH-PURITY CMC!

With Driscose high-purity CMC, mud engineers can stabilize drilling fluid viscosity, water loss, gel strength and cake thickness in the proper range for each drilling location. Viscosities of Driscose muds can be maintained at a level high enough to lift the cuttings and suspend weight materials and low enough to permit good circulation velocities. Furthermore, Driscose emulsion muds resist contamination by bacteria, salt, water, calcium, cement and other liquids and solids encountered in the hole.

Driscose is available from your regular mud dealer in three grades: High Viscosity (99+% pure CMC), Medium Viscosity (99+% pure CMC) and Technical Grade (72+% CMC). Insist on Driscose CMC . . . your best insurance for a trouble-free hole.

The Proof is in Performance!

DRILLING SPECIALTIES COMPANY
Bartlesville, Oklahoma

*Driscose is a trademark for Sodium Carboxymethylcellulose.

Are Montanans missing a bet?

BY FRANK J. GARDNER

ROCKY MOUNTAIN wildcatters should take a leaf from the Canadian wildcatter's notebook. No region in western Canada has undergone as intense exploration this year as the Foothills belt of southwestern Alberta. And the effort has uncovered a chain of rich gas-condensate fields.

Three excuses . . . Why the same effort hasn't been expended in northwestern Montana's Disturbed belt, a southward extension of the same region, is anybody's guess. Among the excuses we hear are landownership problems (most land lies in Indian reservations and national forests), lack of gas markets, and the high cost of exploration. These same difficulties have not deterred the Canadians.

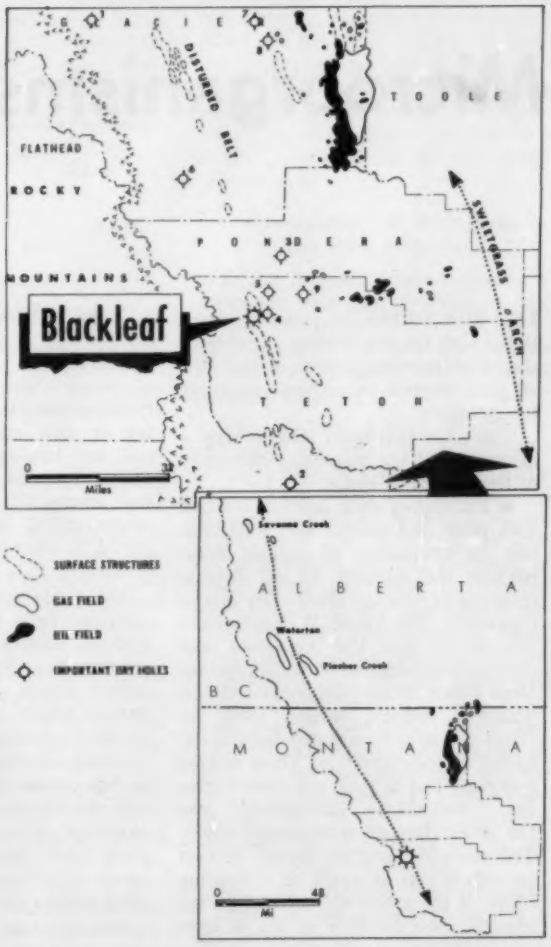
One recent strike in Teton County should serve notice on Montana oil finders that they're overlooking a bet. Northern Natural Gas Producing Co., at its 1 Blackleaf-Federal-A, in Section 13-26n-9w, completed the Disturbed belt's first commercial gasser. The gas flow of 6,293 M.c.f. daily through a 5/8-in. choke was not too impressive, but the shallow Mississippian pay zone at 3,794 ft. **was.** These same Mississippian objectives lie at 7,000-12,000 ft. across the border in Alberta.

The true difficulty in exploration of Glacier, Pondera, and Teton counties is the complex geology. Again, this has failed to stop the Canadians. The overthrusts and complicated fault plates at Savanna Creek, for instance, once baffled the best Canadian brains. But these structures have paid off. The same overthrusting, overturning, and repetition of formations can be expected in Montana.

And too few tests . . . Montana operators simply have not drilled enough wildcats in the belt to arrive at even a preliminary subsurface picture. Spotted on the map are all the important wildcats of the past 5 years. One of these (No. 6 on the map) was Union Oil Co. of California's 1 Otter Woman Morning Gun, a highly publicized well that actually flowed gas at rates up to 6,000 M.c.f. per day plus 250 bbl. of condensate before abandonment for mechanical failure. This flow was from Madison-Mississippian at 9,000 ft., and at the time, was widely heralded as "the most important discovery since the Williston basin."

Didn't daunt Northern . . . Perhaps the Blackleaf discovery will stimulate more Disturbed belt activity; certainly, if the Mississippian reservoirs can be anticipated above 10,000 ft., this 1,900-sq.-mile region should tempt the independent oil hunter. Then, below the Mississippian, rocks of Devonian age may be expected to produce, as they have in some of the Canadian fields. Of the nine wildcats spotted on the map, only two went deep enough to pierce the Devonian.

Northern Natural is now well under way with its first confirmation to the Blackleaf discovery; its 1 Blackleaf-Federal-B is drilling below surface casing in Section 19-26n-8w, 1 mile southeast of the discovery. Northern is one company that **has** taken a leaf from the Canadian notebook . . . a Blackleaf.



Legend to numbered wells:

1. Gulf - Pan American 1 Blackfeet - Government, TD 12,727 ft. (Miss.), 1957.
2. Gulf - Pan American 1 Gelsinger, TD 9,332 ft. (Miss.), 1957.
3. Continental 1 Burdette, TD 5,132 ft. (Miss.), 1956.
4. Gulf - Pan American 1 Teton-Knowlton, TD 7,850 ft. (Devon.), 1956.
5. Gulf 1 Clark, TD 5,300 ft. (Miss.), 1956.
6. Union 1 Morning Gun, TD 9,556 ft. (Miss), 1955.
7. Carter 1 Thelen, TD 4,788 ft. (Miss.), 1955.
8. Union 534 Tribal, TD 6,007 ft. (Devon.), 1954.
9. Mule Creek Oil Co. 1 Rockport, TD 3,800 ft. (Miss.), 1954.

NORTHWESTERN MONTANA'S Disturbed belt has its first producing field at Blackleaf. A vast virgin territory with numerous surface uplifts and a geologic similarity to Canada's prolific Foothills belt, the Disturbed belt has seen only nine important wildcats in the last 5 years.

Microorganisms play big role

in the origin of oil and coal

BY BARTHOLOMEW NAGY
Fordham University

THE BIOCHEMICAL processes associated with the metabolism of bacteria and other microorganisms in soils are of great interest to carbon-compound geochemistry.

There are two main reasons why a discussion of the microbial chemistry of the soils is in order:

- Because of their intimate contact with plant and animal life, soils contain an abundance of organic compounds; the majority of the organic reactions in soils are effected by microorganisms. The cause of geochemical interest is that the inorganic **and** organic components of soils together form a part of the sedimentary debris which is eroded, carried away by rivers and streams and deposited in the basins of sedimentation. These eroded inorganic and organic soil constituents are, consequently, incorporated into the newly formed sedimentary rocks. Therefore the organic matter present in soils is just as much of a building block of the sedimentary rocks as, for example, are the illite or quartz mineral particles.
- The biochemistry of a number of soil microorganisms has been studied in some detail; it appears that more basic information is available on this subject than on the microbial chemistry of marine and lacustrine muds. One may add that the various soil-analysis prospecting techniques, an application of geochemistry, cannot be properly performed without an understanding of the chemistry of soil microorganisms.

Five types of microorganisms . . . Present in soils are bacteria, algae, molds, yeasts, and protozoa.

True bacteria are single-celled plants; their average size is approximately 1 μ (1/25,000 in.). Although it has been often stated that true bacteria are a simple form of organisms, the biochemistry of the life processes of bacteria can be as complex or even more complex than that of other cells. Bacteria can effect various organic reactions.

Algae are either single-celled or multicellular plants; classified according to their color as green, brown, red, and blue-green algae. The blue-green algae have the simplest structure among all four groups; they are single celled, but usually they are found in colonies. Such colonies are present in soils.

Molds are multicellular fungi characterized by a filamentous branching growth, known as a mycelium. In general they oxidize organic matter; certain molds produce organic compounds which inhibit the functioning of other organisms.

Yeasts are single-celled fungi which do not possess the mycelium. In general, the film-forming yeasts cause the oxidation of sugar, alcohols, and organic acids, and the bottom and top yeasts attack carbohydrates and produce carbon dioxide and alcohol.

Protozoa are single-celled animals. Certain forms which contain chlorophyll have a metabolic process similar to algae; most of them, however, utilize complex organic molecules in their metabolic processes, and they often feed on algae, and on other protozoa.

These plant and animal microorganisms are abundant in soils. Sarles, Frazier, Wilson, and Knight (1951) offered an estimate of the abundance of soil microorganisms, realizing that this abundance is greatly influenced by changes of environment. They suggest that the usual number of individual microorganisms present in 1 g. of soil is the following: true bacteria 1 to 10 million, algae 1 to 100 thousand, molds 1 to 100 thousand, and protozoa 10 to 100 thousand.

Most of the microbial population is contained in the upper 6 to 12 in. of the soil. The physical chemical parameters which control the properties of soils as a culture medium are the temperature, pH, oxydation-reduction conditions, presence of inhibitory substances, and of course, the composition of organic debris on which the microorganisms feed.

Constituents of Organic Debris

The organic matter reaching the microorganisms of the soil consists of a great variety of solid and liquid products of animal and plant metabolism and other organic decomposition products. The following is a list of the more common constituents of organic debris:

- Nitrogeneous organic compounds, including proteins, amino acids, amines, alkaloids and nucleic acids.
- Carbohydrates, including mono, di, tri, and polysaccharides (such as cellulose).
- Lignins.
- Tannins.
- Glucosides.
- Organic acids, such as formic, acetic, proprionic, lactic, citric and stearic acids; furthermore, salts of organic acids, such as calcium oxalate, esters of organic acids, such as ethyl acetate.
- Fats and oils and waxes. (The former are the glycerol esters of fatty acids and the latter are esters of fatty acids and higher alcohols).
- Pigments, including chlorophyll, carotenoids, and anthocyanins.

The list includes a considerable part of known organic compounds; thus, soils are recipients of a very wide variety of organic molecules. The return of a single green plant into the soil alone results in the addition of most of the substances named in the list. The decomposition of organic matter by soil microorganisms is only partially understood; however, major type of reactions participating in the decomposition can be outlined.

Complex compounds are first hydrolyzed by microorganims to simpler and more soluble substances. These products in turn are attacked by other microorganisms with the result of further simplification. The decomposition of the nitrogeneous and non-nitrogeneous compounds may be discussed separately.

Bacteria and molds are mainly responsible for the decomposition of nonnitrogeneous compounds. The first step usually involves hydrolysis catalyzed by specific enzymes. This process can take place under both aerobic and anaerobic conditions. Some of these reactions are:

$$\text{cellulose} + H_2O \xrightarrow{\text{cellulase}} \text{cellobiose} + H_2O \xrightarrow{\text{cellobiase}} \text{glucose}$$

$$\text{hemicelluloses} + H_2O \xrightarrow{\text{cytases}} \text{monosaccharides}$$

$$\text{pectins} + H_2O \xrightarrow{\text{pectinases}} \text{monosaccharides and uronic acids}$$

$$\text{fats} + H_2O \xrightarrow{\text{lipase}} \text{glycerol and fatty acids.}$$

The products are available to attack by other microorganisms. The second step of the decomposition process proceeds in different directions depending on whether aerobic or anaerobic conditions prevail. Under the former conditions most of the end products are completely oxidized, whereas anaerobic environment results mainly in incompletely oxidized products.

Anaerobic bacteria and certain yeasts acting upon glycerol, fatty acids, uronic acids, and monosaccharides causes the formation of

- Organic acids such as formic, acetic, proprionic acid, etc.
- Alcohols such as ethyl and butyl alcohol.
- Gases such as methane, hydrogen, carbon dioxide.
- Miscellaneous products such as aldehydes and gums.

The action of aerobic bacteria and molds upon the same substances results in complete oxidation and consequently leads to the end products carbon dioxide and water. The omission of lignin (a major constituent of plants) is due to the fact that lignin is known to be reasonably resistant to microbial attack.

Hydrolysis is also involved in the decomposition of nitrogeneous organic compounds. Proteins, for example, are first hydrolyzed to simpler compounds; however, due to the complexity of the protein structures and because only specific enzymes can catalyze specific proteins, the protein decomposition is a slow process. Bacteria and molds are mainly responsible for the protein hydrolysis. This may proceed in both aerobic and anaerobic environments. Some of the steps involved in the decomposition of proteins are:

$$\text{proteins} + H_2O \xrightarrow{\text{proteinases}} \text{polypeptides}$$

$$\text{polypeptides} + H_2O \xrightarrow{\text{polypeptidases}} \text{amino acids}$$

$$\text{amino acids} + H_2O \xrightarrow{\text{deaminases}} \text{organic acids} + \text{ammonia}$$

The decomposition of simple, nitrogeneous but nonprotein compounds is also of interest. Liberation of ammonia usually occurs and the action of anaerobic bacteria causes the development of such foul-smelling byproducts as mercaptans, skatol, hydrogen sulfide, etc. The final products of such a process taking place under aerobic conditions are ammonia, carbon dioxide, and water. The accumulation of residual and synthesized organic matter in the soils is the humus. The organic chemical composition of the soil represents a continuously changing and evolving state, involving the decomposition and synthesis of a wide variety of compounds.

The recent work of Meinschein and Kenny (1957) points out the complexity of organic compounds present in soils. These authors investigated the composition of soil waxes, extracted from six soil samples. The samples came from swampy regions in Sumatra, arid regions in Texas, and from Wyoming. Chromatographic, infrared, and mass spectroscopic studies in conjunction with hydrogenation have shown that the principal constituents of the soil waxes are normal aliphatic acids, normal primary aliphatic alcohols, and sterols. The presence of sterols and of possibly triterpene-type compounds suggests that the waxes are the products of biochemical processes. The authors point out the possibility that the wax esters can lead to hydrocarbon formation upon hydrogenolysis. These findings, if they are proved to be relevant to all types of soils, may cast some doubt on the applicability of soil wax-analysis surveys proposed by Rosaire (1939).

Time is one factor which infuences the organic chemical reactions in soils; for example, protein decomposition takes a relatively long time. Consequently, the organic debris will reach the basins of sedimentation in various stages of decomposition, depending on the length of time it was the subject of microbial attack in soils. Certain sedimentation processes can arrest microbial action shortly after the sediment has reached its final resting place. Therefore, the type of organic compounds present in certain types of sedimentary rocks should be useful indicators of erosion and sedimentation. For example, finding of lignin may indicate rapid erosion and burial. Analysis of organic compounds in fossils, such as the work of Abelson (1955), is also expected to lead to a better understanding of the paleoenvironment.

Geochemistry of Petroleum and Coal Deposits.

Before discussing the chemistry of petroleum and coal deposits, it may be well to summarize briefly some of the highlights of the geochemical background, presented in detail in the previous chapters.

The organic matter present in petroleum and coal deposits represents only one step in the continuous cycle of synthesis and decomposition of organic compounds in nature. It was shown that the first step in this dynamic picture was the evolution of amino acids and other biochemical intermediates in the atmosphere and hydrosphere of the primitive earth, followed by further synthesis and decomposition effected by plant and animal metabolism.

Geological processes, particularly the geosyncline-controlled sedimentation, affected the distribution and the path of development of organic compounds; but, in turn, the geological processes were influenced by the action of carbon compounds.

The accumulation and chemical evolution of the organic molecules of the petroleum and coal deposits were controlled by (1) the character of sedimentation, (2) climatic conditions, (3) the physical and chemical environment in the sedimentary basin and (4) by the biochemical reactions effected by microorganisms. The factors (1), (2), (3) and (4) are interrelated.

To be able to understand the chemistry of organic mineral deposits and to be able to predict their occurrence in rock strata one has to consider such parameters as the orogenesis, climatic fluctuations, the behavior of the thermocline, production rates, oxidation-reduction potentials, soil and swamp microbial chemistry, etc. in the geological past. It is the purpose of this paper to emphasize that a general and sufficiently deep understanding of the problem can only be gained by considering the dynamic interrelationships of sedimentary geochemistry.

Coal deposits and the chemistry of coalification need to be discussed together with the chemistry of petroleum deposits, because although coal and petroleum represent two different

chemical systems, their genetic processes seem to have a number of significant factors in common.

Coal is formed from plant matter, and evidence indicates that petroleum too has evolved from plant and or animal life. Futhermore, both are found in sedimentary rocks, therefore both had to be affected by the physical chemical environments characteristic of sedimentary-rock formation.

On the other hand, their chemical composition is different; petroleum is composed mainly of hydrocarbons, whereas the organic compounds in coal contain oxygen, sulfur, and nitrogen besides carbon and hydrogen. If the starting material was basically the same, and if the end products are different, the intermediary chemical evolution too must have been different. The difficulty is that it is not easy to find traces of such a difference in the chemical mechanisms in the geological past, at least when searching with conventional methods.

Origin of coal . . . Botanical evidence shows that coal was formed by the accumulation, burial, and chemical alteration of plant matter. The complex organic materials which constitute the plants decompose in approximately the following order: protoplasm, chlorophyll, oils, carbohydrates (starches, cellulose, lignin), epidermis, seed coats, spore and pollen components, waxes, resins. Protoplasm is the least resistant to decomposition and resins are the most resistant.

There is evidence indicating that the first step in the chemistry of coalification usually takes place in peat swamps. Plant matter, which is eventually to be converted to the coal constituents, is first altered in a swampy environment characterized by continuous water saturation and uniformity of climate followed by rapid burial. Shallow water, high production rates, a stable thermocline and reducing condition prevalent in the mud are attributes of such a swampy condition. Microbial action is controlled by the reducing environment and water also acts as a control of certain toxic substances produced by bacterial metabolism.

The biochemical decomposition process in the peat-swamp stage leads to the accumulation of humic matter, mentioned before. During the late peat-swamp stage the degraded organic matter, which is included in the humic matter, combined with water, forms a colloid. It has been suggested that compact peat is a hydrosol which upon further alteration becomes a hydrogel in low-rank coals. In the latter colloidal stage, humic acid gels may transform to alkali insoluble humic compounds. The formation of the colloids and the expulsion of water is probably a significant step in the transformation of peat to coal. After burial the organic decomposition and colloidal evolution process is effected by elevated temperatures and pressures. The intensity of these geological conditions has been correlated with the rank of coal, i.e. its carbon content.

Chemistry of coal . . . This biological and geological development process can be expressed in terms of chemistry. The source of coal (the plant matter) is composed of a variety of complex molecules, such as carbohydrates (cellulose, lignin, etc.) proteins, etc. These compounds are first hydrolyzed and converted to more soluble compounds in the early peat-swamp stage. This is accompanied and followed by biochemical reactions leading to partially oxidized compounds in the colloids. After burial, these oxygenated compounds undergo condensation with loss of water and carbon dioxide. The end product is an accumulation of mainly condensed, cyclic molecules, in which six-membered rings predominate, composed of oxygen, nitrogen, and sulfur beside carbon and hydrogen.

Oxygen exists in coal in several forms; hydroxyl, carboxyl, carbonyl groups may be present, particularly in lower-rank coals. The last stage of condensation in which oxygen is retained is probably cyclic ethers and linear ethers.

Nitrogen is present in large heterocyclic molecules, whereas the chemical configuration of organic sulfur in coal constituents is not fully known.

Carbon and hydrogen occur in various combinations; alicyclic and olefinic double-bond ring structures are common.

Paraffinic material can also occur. This is thought to be derived from plant matter without much alteration.

The inorganic content (ash content) varies; a pure coal may have as little as 2-3%, whereas a more average sample may run as high as 10%.

Traces of several metals have been identified in coals, such as vanadium, manganese, barium, silver, gold, copper, lead, zinc, etc.

In short, coalification is a degradation process, involving the loss of some of the original constituents including oxygen, arrested before the organic matter turned into pure carbon (graphite) or perhaps into mainly carbon and hydrogen containing molecules (hydrocarbons).

Two observations ought to be made at this point:

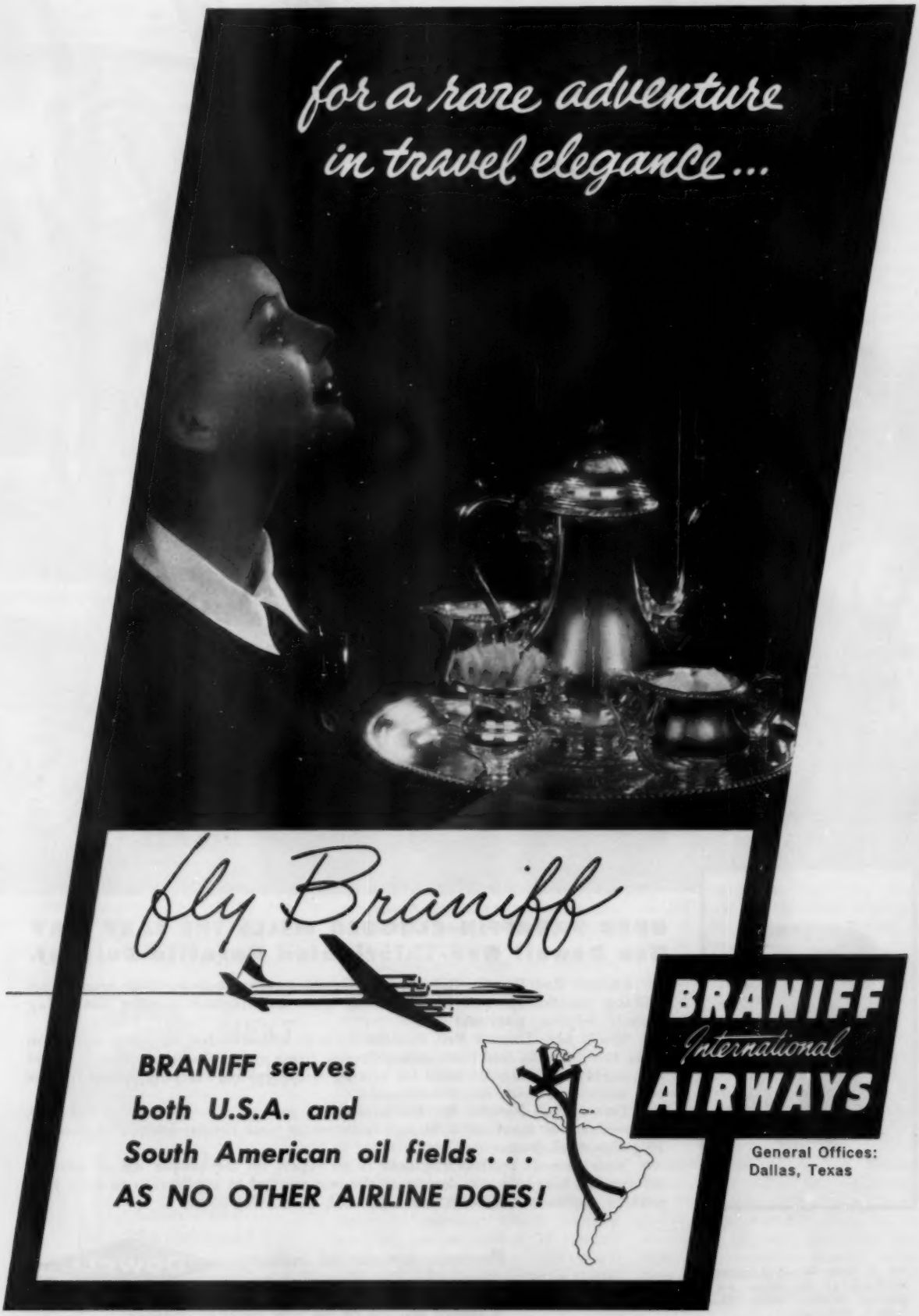
- First, a unit volume of coal does not usually contain the abundance of inorganic mineral matter in such an intimate admixture as a unit volume of petroleum reservoir rock, in situ, saturated with reservoir fluids.
- Second, the common occurrence of plant impressions in coal seams and laminae suggests that at least a part of the plants were, at the time of burial, intact enough to preserve a facsimile of their original morphology. In other words they were not physically and chemically separated into their elementary constituents and synthesized and resynthesized into modified molecules, such as is known to occur to organic debris exposed to prolonged microbial and climatic attack in the soils.

Petroleum differs . . . Unlike coal, petroleum is composed chiefly of hydrocarbons. Pennsylvania crude oils contain approximately 97-98% hydrocarbons, light Mid-Continent and Gulf Coast crudes average 90-95%, whereas certain heavy California and Mexican crude oils may contain only 50% hydrocarbons.

The hydrocarbon content of petroleum consists of paraffins (alkenes), cycloparaffins (naphthenes), and aromatics. Unsaturated hydrocarbons are not present in the great majority of crude oils. The paraffins are characterized by low degree of branching and the cycloparaffins are characterized by the common occurrence of cyclopentane and cyclohexane. Aromatic constituents are usually less abundant than the paraffins and cycloparaffins. The oxygen compounds which were identified in crude oils are of the acidic type; neutral oxygen compounds, such as alcohols, ketones, etc. have not been found. Traces of fatty acids and carboxylic acids of cyclopentane homologs (naphthenic acids) occur in petroleum. Some of the rare nitrogen-containing compounds were found to be alkyl derivatives of quinoline and pyridine. Sulfur occurs as hydrogen sulfide, mercaptans, etc.

The amorphous, solid resin and asphaltene constituents of petroleum are of particular interest. These compounds are probably composed of condensed polycyclic aromatic and cycloparaffinic rings connected by linear groups. The possibility that asphaltenes form colloidal solutions peptized by aromatic hydrocarbons or by other petroleum constituents has been suggested. The asphaltene and neutral resin contents of crude oils vary. In Pennsylvania crudes it is as low as 1.5%, in heavy California and Mexican crudes it can be as high as 30-40%.

Organic metallic compounds are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also present in petroleum together with metal, chiefly Na and Ca salts, dissolved in water emulsified in the oil. Vanadium and nickel, probably in porphyrin structures, averages approximately 5 p.p.m. in U. S. petroleum, with the exception of California crude oils where the abundance of these metals is usually higher (approximately 40 p.p.m.). The metal-porphyrin complexes are considered by many investigators to be important indicators of petroleum evolution environments. In a recent paper by Dunning and Moore (1957) some interesting aspects of petroleum porphyrin chemistry are discussed.

In order to be able to explain the evolution of petroleum, at least to the same extent as coal formation can be explained, one has to account for the presence of all of these petroleum constituents separately. Furthermore, following the suggestion of Thompson (1937), it may be reasonable to seek such an explanation through ordinary geological processes, excluding unusual and extraordinary natural phenomena. Obviously, the finding of petroleum deposits would be less difficult if the exploration geologist would know the exact nature of the geological and chemical processes which lead to petroleum formation, and thus, he would be in a position to identify and follow these processes through the geological column. The interesting point is that a great variety of fundamental information is now available in the modern scientific literature; part of it, at first glance, is seemingly unrelated to petroleum evolution, waiting to be fitted together into a coherent and useful picture.

Note: Part 1 of this series on geochemistry appeared in the June 30, 1958, issue, Part 2 on July 14, and Part 3 on July 28. The concluding Part 5 will appear in the August 25 issue. Requests for reprints of the entire series should be addressed to The Oil & Gas Journal, 211 South Cheyenne Avenue, Tulsa, Okla.

NEXT WEEK

Oil in the Canadian Maritimes?

In California

Kern County sets the pace

MOUNTAIN VIEW field in Kern County, while not turning up anything particularly spectacular lately, continues to be one of the state's leading active drilling areas.

Union Oil Co. of California recently stepped up operations in its two discovery areas near Arvin, the Stenderup and Houchin-Guimarra pools. Currently, Union has an extension test drilling below 7,492 ft. about midway between the Stenderup pool area and the DiGorgio area of the main Mountain View field, and a north extension test in the Houchin - Guimarra pool being completed at 8,150 ft.

- About ½ mile south of the small community of Arvin on the south end of the Mountain View field, Carr & Smallwood, operators, were drilling below 4,302 ft. on an extension test.
- On the extreme north edge of the field some 8 miles north of the Arvin-Stenderup-Houchin areas, Kern Oil California, Ltd., was drilling below 6,861 ft. on an offset to Standard Oil Co. of California production.
- Signal Oil & Gas Co. recently reached total depth at 12,836 ft. with a wildcat test 1½ miles south of the Houchin-Guimarra and an equal distance southwest of the nearest main Mountain View production.
- Three miles west of the Houchin-Guimarra area, Termo Co. staked location for a 13,000-ft. wildcat.

California's Wheeler Ridge tests attract interest

Two extension tests to Richfield Oil Corp.'s 1956 discovery in the Wheeler Ridge Community area east of the main Wheeler Ridge field were attracting attention.

Richfield completed an extension test two locations east of the discovery well flowing 361 bbl. daily of 55.6° gravity crude through a 22/64-in. choke from the interval 8,565-8,625 ft. The discovery well is completed in a JV sand interval at 7,980-8,060 ft.

Kern Oil Co. of California, Ltd., was setting pipe in a 7,923-ft. extension test northwest of Richfield's Wheeler Ridge Community discovery. The Kern well, 85X KCL, reported these results on a formation test of the interval 7,786-7,923 ft.: Open 1 hour, 55 minutes, 850-ft. nitrogen cushion, gas surfaced in 25 minutes through the trap at a 2,300-M.c.f. rate with a 16/64-in. choke, 1,210-lb. pressure on the packer.

Desert test on pump

Flamingo Oil Co. reports it has reached total depth at 3,100 ft. with its desert wildcat 17 miles north of Needles on the California-Arizona border. Flamingo plugged back to 2,650 ft., nitro blasted the test and was installing a pump. No reports on shows have been made nor have any tests results been announced.

California highlights . . . Guiberson and Burke were erecting a derrick near the intersection of Temple and Vermont in downtown Los Angeles to test for deeper production in the area of the old Los Angeles oil field. A little farther out, Union Oil Co. was drilling below 5,079 ft. on its wildcat on the Paramount movie lot in Hollywood. This test originally had a projected total depth of 4,500 ft. but it has reportedly been set now at 6,000 ft. This also is in the area of the old Los Angeles oil field.

Oregon Sunray test continues

Sunray Mid-Continent Oil Co. was drilling below 7,161 ft. on 1 Bear Creek unit in Crook County.

Canada bags biggest gaswell

TWO of western Canada's largest developers of natural gas this week gave the Borden Royal Commission on Energy something else to think about by flowing gas at high rates from its D3 zone of Devonian discovery hole in the Berland River region of central west Alberta.

Along with the astounding results obtained from that hole, one of the participants in it also made its second gas discovery in the same well at a Foothills test being drilled in the Panther River region of southwestern Alberta. The two companies responsible for these developments were the British American Oil Co., Ltd., and Shell Oil Co. of Canada, Ltd.

Berland River . . . The Berland River strike, drilled on jointly held B.A.-Shell Reservation rights comprising some 400,000 acres in the vicinity of the well, has been estimated to contain an absolute open-flow potential of 400 M.M.c.f.d. If true it would therefore be Canada's

largest gas well, shattering by 112 M.M.c.f.d. the present record. The present record holder was also drilled by British American.

The well is situated in Dick Lake field of central Alberta, midway between Calgary and Edmonton. It is also completed in the D3 reef of Devonian and during production tests established an absolute open-flow potential of 288 M.M.c.f.d.—enough in itself to supply the present requirements of Trans Canada Pipeline System.

Panther River . . . Shell's second gas-bearing structure in its 1 Panther River well was found in the second plate of Mississippian. The well had previously indicated the first Devonian commerciality in the Footshills Belt by gassing at high rate from around the 9,000-ft. level. Following that strike, the well was deepened and drill bit entered a new sequence of horizons with the second Mississippian age being found around 12,000 ft. Although the recent find is not nearly as prolific as the Berland River hole, the presence of gas, particularly in the Devonian, must rate the well as one of western Canada's best discoveries this year.

Actually the high rate set for the Berland River venture was no surprise as indications of what was to come was indicated through drill-stem tests when the well was being drilled. Flow rates as high as 27 M.M.c.f.d. were recovered from those operations and that rate is the best ever recovered on drill-stem test in western Canada.

A gross pay sector of some 663 ft. was encountered in the D3 reef around the 12,000-ft. level with 550 ft. of that assumed as net pay. Recent flow tests, meanwhile, carried out in an open hole section below production casing, which is set to 12,008 ft., and following acidization of the structure, flowed at rates up to 57 M.M.c.f.d. on restricted choke. The well is now standing, waiting on service equipment to be moved on to it for completion.

Shell's wholly owned Panther River venture, right in the Rocky Mountains 35 miles due north of Banff townsite, had already assured its backer of commercial success in the Devonian. The flow rate at that time of 7,200 M.c.f.d. measured on drill-stem test bears that out.

Most recent drill-stem evaluation, meanwhile, in the second set of Mississippian covered 1,200 ft. of zone and was bottomed on the completion depth of the hole at 13,414 ft. There is an estimated 100-ft. thick pay sector present and it gave gas at rate as high as 1 M.M.c.f.d. but was still increasing when valve was shut in completing the test. Shell is currently carrying out completion procedure on the well and it is expected that this latter zone will be the first to be evaluated.

If either strike is to be developed rests entirely in the hands of the federal Government's Borden Commission. That commission was set up to study the energy situation in this nation and its findings, particularly on the natural gas situation are expected to be tabled shortly through an interim report. That interim report will probably contain recommendations as to what gas is available for export from Aberta. Trans Canada Pipeline Co. wants to export natural gas to the Midwest United States, while Westcoast Transmission Co. and Alberta and Southern Gas Transmission Co. both have applications before Alberta's Oil and Gas Conservation Board for lines from Central and Southwest Alberta into the Pacific Northwest United States.

. . . at Saddle Hills

A SECTION of bluesky has yielded important gas production in the Saddle Hills area of western Alberta in Canada.

The Bluesky is a Cretaceous gas

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The Nevada "vacancy" was recently described in our Muldrow MEM-O (an informal report covering petroleum mapping and associated activities) — along with other helpful information about reproduction materials, repro shop hints, current map coverage, etc. Would you like to be added to the mailing list, free of charge? Drop us a line on your company letterhead. (Please mention this publication.)

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sand in which Pan American Petroleum Corp. completed a wildcat well, the A-1 Woking. The well flowed at an estimated rate of 36 M.M.c.f.d.

Recovery was through perforations 4,611-21 ft., with top of pay at 4,611 ft., total depth at 6,753 ft., and plugged-back total depth at 4,695 ft. The A-1 Woking is located in LSD 10, 25-75n-5w6. The well site is about 75 miles southwest of Peace River, Alta., in the Saddle Hills area. Nearest production is about 10 miles west.

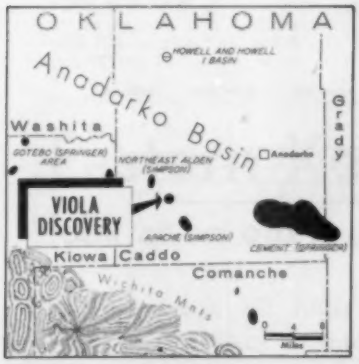
Pan American holds 80% interest in the well and in about 50,000 acres in a Crown Reservation in the area of the well. The remaining 20% interest is held jointly by Royalite Oil Co., Ltd., and Canadian Petrofina, Ltd.

. . . at Kaybob

AN EXCELLENT WELL was completed by Atlantic Refining Co. in its first drilling effort on acreage obtained earlier this year in Kaybob field in the Province of Alberta, Canada. The company acquired a 100% interest in two blocks totaling 640 acres in this area in January 1958.

The 4-11 Kaybob flowed at the rate of 1,200 bbl. per day on test through a ¼-in. choke at a depth of 9,860 ft. The drilling rig is now being moved and a second development well will be started immediately.

In other ventures with joint owners, the company holds a net interest of approximately 247,000 acres in Canada, a portion of which is also productive.



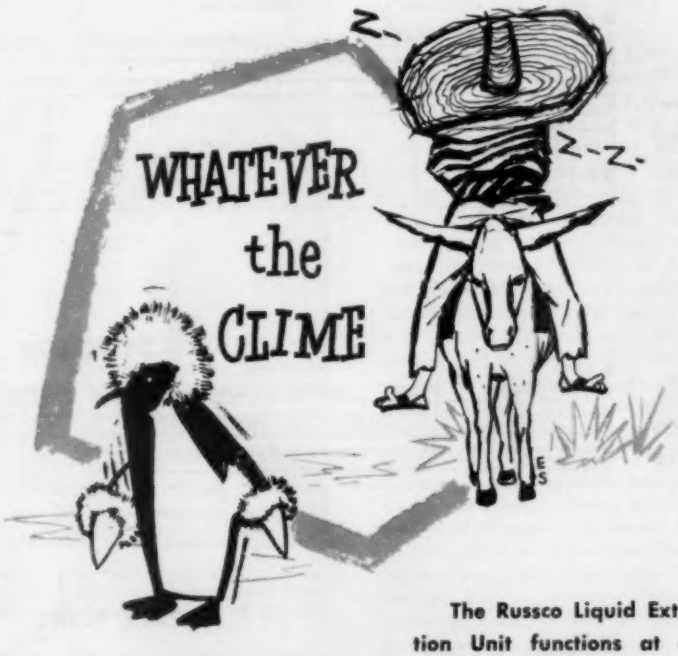
A REMOTE wildcat in Caddo County, southwestern Oklahoma, apparently has established rank Viola-Ordovician oil production in the vast Anadarko basin.

New pay for Anadarko basin

FAR-REMOVED Viola production appears to have opened a new pay for the Anadarko basin. Cities Service Oil Co. 1 Weidenmaier, SE SE NE 16-6n-12w, north of Simpson production at Apache and southeast of Simpson production at Northeast Alden, flowed oil at the estimated hourly rate of 20 bbl. on drill-stem test of the Viola at 7,001-91 ft. Gas volume reached 1 M.M.c.f. per day.

The closest Viola production is to the southeast in the Comanche Lake area of Stephens County, out of the Anadarko basin. Previously, there had been some small Viola output far to the northwest in Harper County's Lovedale area. The Viola lies just above Oklahoma's prolific and thick Simpson-Ordovician section. In most circles the Viola is not regarded very highly as a prolific source of oil. It produces at several scattered areas in Oklahoma and southern Kansas.

Successful completion of this Caddo County prospect could easily put a dent into the shyness with which oil hunters probe the Viola. The Caddo County indicated discovery is on the Apache fault trend where Sinclair found Simpson production at Northeast Alden a couple of years ago. The well is another stepping stone in one of the hottest wildcatting basins in the country.



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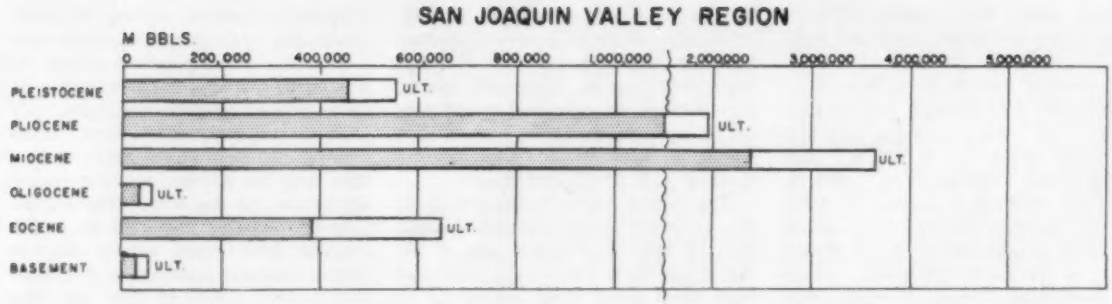
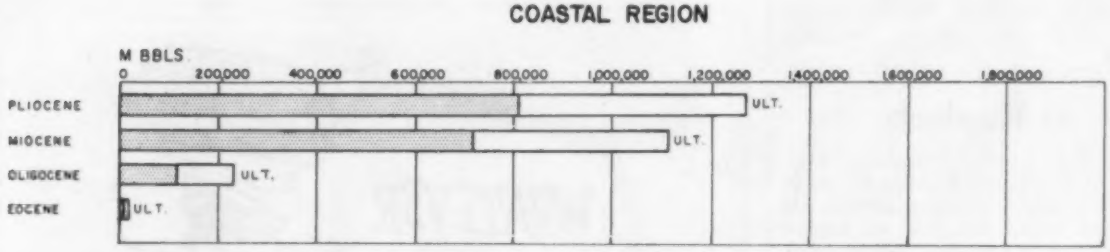
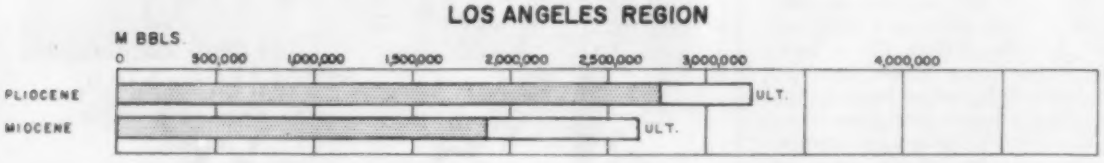
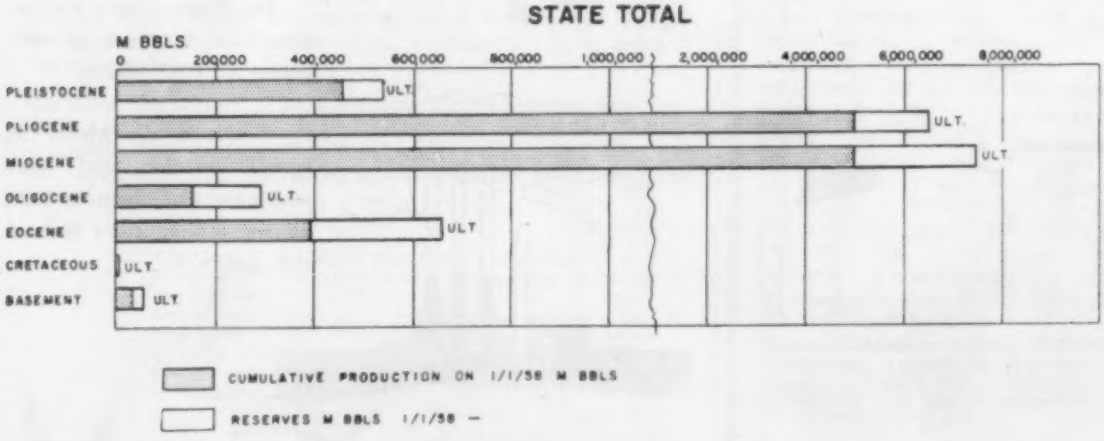


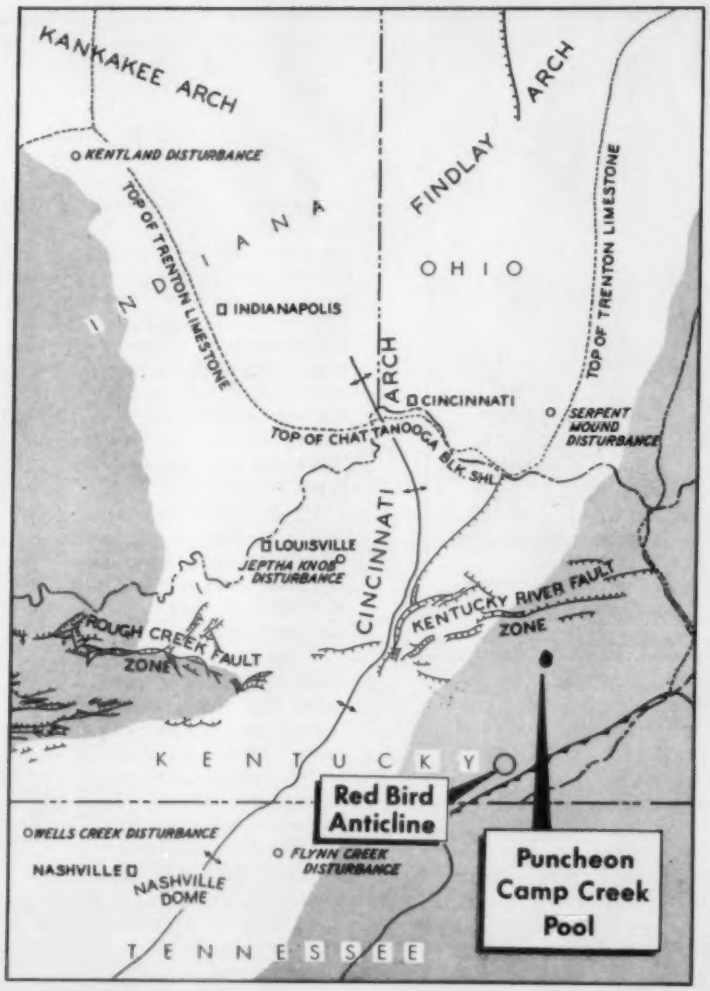






Here's a new review for California

THE CONSERVATION COMMITTEE of California Oil Producers has just released its annual review of California oil production, 1957. This is a complete and detailed account of the industry in California. The book is divided into sections on oil production, conservation, geology, exploration, development, maps, and other pertinent data. Shown above is cumulative and ultimate production for California pools by geographic areas and geologic groups.



HERE IS A PART of the oldest and biggest gas and oil-producing provinces in the nation—the Appalachians. Recent oil finds promise that new vigor will fire exploratory activity in this vast and complex cradle of oil and gas in the U. S. Fig. 1.

Eastern Kentucky—a new look at an old area

Fresh oil finds give it a good oil-producing potential — and it has a built-in gas future owing to proximity to eastern industrial markets

BY R. E. GREENFIELD

IN THE eastern United States obvious surface structures were exploited in the shallow horizons, and oil exploration moved westward in search of more of the same. Today exploration maturity has been reached in the Mid-Continent and Texas. The oil industry continues to work harder for new reserves in regions having no more initial promise than many of their eastern counterparts, which were not fully developed. Some areas east of the Cincinnati-Findlay arch have stood still. Such an area is eastern Kentucky.

Eastern Kentucky is situated in the Appalachian foothills province. Here, deeply eroded Pennsylvanian strata (dominantly nonmarine) form the characteristically rough topography of the eastern coal fields, which extend westward until a northeast trend of high ridges and flat valleys gives way to the more gentle topography of the outer Blue Grass of Kentucky.

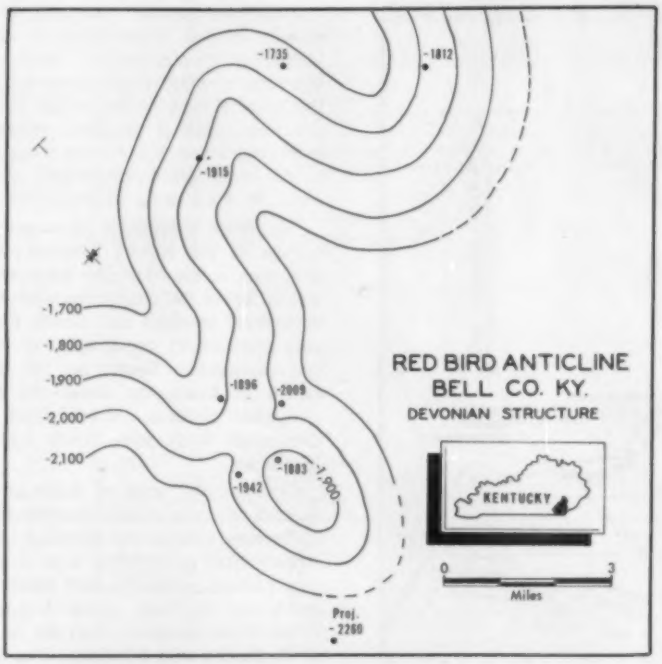
The most prominent physiographic feature of this eastern Kentucky border zone is the Waverly escarpment, which marks the change between Carboniferous (clastic) and Lower Paleozoic (carbonate) topography in Central Kentucky. South of the Blue Grass, or Lexington dome, the Mississippian plateaus extend across the Cincinnati arch into South Central Kentucky.

Geologically, eastern Kentucky is located near the eastern margin of the continental craton, yet foreland to the Appalachian geosyncline with its metamorphosed sediments and associated tectonics. In fact, great low-angle thrust faults terminate near the border of Kentucky and Virginia. The Cincinnati arch, striking north-northeast, forms the western margin of the eastern Kentucky shelf, away from which the Paleozoic rocks dip gently to the east. The Cincinnati arch became a barrier to free marine circulation and influenced stratigraphy as early as Middle Silurian time. Ordovician uplift or marginal sagging is further indicated (Freeman, Louise B., 1951).

Structural and stratigraphic relations along the eastern flanks of the Cincinnati arch appear favorable for the accumulation of oil and gas. Near the edge of the outer Blue Grass the Devonian Boyle formation has been shown to truncate beds of Richmond and Maysville age (McFarlan, A. C., 1939). Downdip the Devonian black shale overlaps dolomite of lower Devonian or Silurian age, and the dolomite is locally porous. Possibly older unconformities exist high on the flanks of the arch, but deep subsurface information is nonexistent.

THE AUTHOR

The author is geologist, fuels branch, Tennessee Valley Authority, Chattanooga. He attended Southern Methodist University and University of Kentucky. He holds B.S. and M.S. degrees in geology. He was formerly employed by Paleontological Laboratories, Midland, Tex., and served as a map compiler in the U. S. Army Corps of Engineers (Topographic).



SOUTHEASTERN KENTUCKY'S Red Bird anticline is an excellent Knox prospect for Appalachian oil hunters. Fig. 2.

Farther downdip onto the shelf regional subsurface information indicates a more conformable succession in the Lower and Middle Paleozoic. Some geologists suspect pre-St. Peter erosion of the Knox dolomite throughput the Appalachian shelf; however, lack of deep subsurface information in eastern Kentucky leaves this question open. Structural significance of any pre-St. Peter erosion cannot be overemphasized.

With a broad, regional view of eastern Kentucky, it is evident that pre-Pennsylvanian compressional forces acted mostly parallel to the axis of the Cincinnati arch. Pre-Pennsylvanian rocks are generally folded in northwest to east-west trends essentially normal to the axis of the arch. Major faulting has the same orientation (see Fig. 1). Because of this important fact no geologist can picture the Cincinnati arch as a true anticlinorium; rather, they see a positive arch, faulted near its axis with some truncation and subsequent deformation of the flanks which tend to cut across it.

East from the Cincinnati arch, Pennsylvanian strata increase in thickness, and surface structures take on a more erratic pattern than in the subsurface (pre-Pennsylvanian) horizons. As the Pennsylvanian was deposited on an eroded surface, these structures do not consistently reflect Middle and Lower Paleozoic structure. Generally in southeastern Kentucky, Pennsylvanian erosion did not cut below the Glen Dean formation (middle Chester), but progressively northward more Mississippian strata were removed until finally the Pennsylvanian Pottsville formation rests on lower Meramec to Osage age limestone in northeastern Kentucky.

The most important localized uplifts in eastern Kentucky are noted on Fig. 1.

Stratigraphy and Production

In eastern Kentucky there is more than 3,000 ft. of strata between the top of the Knox dolomite group and the base of the Pennsylvanian system. The Knox itself is of indeterminate thickness. In general, the Middle and Lower Paleozoic sequence is not unlike that of the Mid-Continent, except that the Mississippian contains fewer sandstones, and the Silurian of extreme eastern Kentucky is sandstone and conglomerate. The Pennsylvanian system of eastern Kentucky is all nonmarine; at least no more than a few brackish-water deposits exist.

• **Pennsylvanian:** The Pennsylvanian sands have never given up a great deal of gas in eastern Kentucky, and practically no oil.

• **Mississippian:** The Mississippian of eastern Kentucky has three distinct depositional units, which together exceed 1,000 ft. in some places. Roughly, the Kinderhook-Osage is fine clastics, the Meramec and lower Chester are carbonate, and the remaining Chester is, where present, sandstone and silt shale. The middle carbonate group of the Mississippian is called the "Big lime," and in southeastern Kentucky its lower beds are equivalent in age to the upper Waverly (Osage) Red siltstones. A facies series exists in this horizon which includes cherty, siliceous limestone (St. Louis facies), oolitic limestone, dolomite, and red beds. It is the dolomite facies of the basal Big lime that produces gas in Central and southeastern Kentucky along with some oil. Although structural position is no doubt a factor in the productivity of these beds, accumulation of hydrocarbons is basically controlled by stratigraphic relations. Porosity is developed in the dolomite facies between the dense, siliceous limestones and the red beds of the upper Waverly.

The Big lime is the biggest gas-producing horizon in the subsurface of eastern Kentucky. Most noteworthy is Big Sandy field of Pike County, where wells of 8,000 M.c.f. gas per day are not uncommon.

• **Devonian:** The Devonian has two distinct units: the Chattanooga black shale and the underlying dolomite (Corniferous: a driller's term not to be confused with Carboniferous). Together this system rarely exceeds 450 ft. in thickness; however, the base of the Devonian in eastern Kentucky is not everywhere established.

The Chattanooga black shale has produced considerable gas in the past, particularly in Magoffin, Floyd, and Johnson counties where sandy layers are developed.

The Corniferous dolomite has produced the most oil in eastern Kentucky, and continues to be promising for the future. In the past, the center of Corniferous production has been in Estill, Lee, and Powell counties, where good porosity is developed along shallow, northwest trending folds and erosional highs. In the early 1920's over 900 wells were drilled in Big Sinking field of northern Lee County, many of which had a 100-bbl. per day initial potential at depths ranging from 750 to 1,250 ft.

The recent oil discoveries at Puncheon Camp Creek, west central Breathitt County, appear to conform to the regional trend of structure apparent in the older Corniferous producing area, which is updip and to the west. At Puncheon Camp Creek, wells are flowing up to 140 bbl. per day at depths near 1,800 ft. Before December 1957, this area was producing only small quantities of gas and oil.

Farther downdip the Devonian-Silurian dolomite is less explored. Except in the places of pronounced uplift, little Devonian mapping has been

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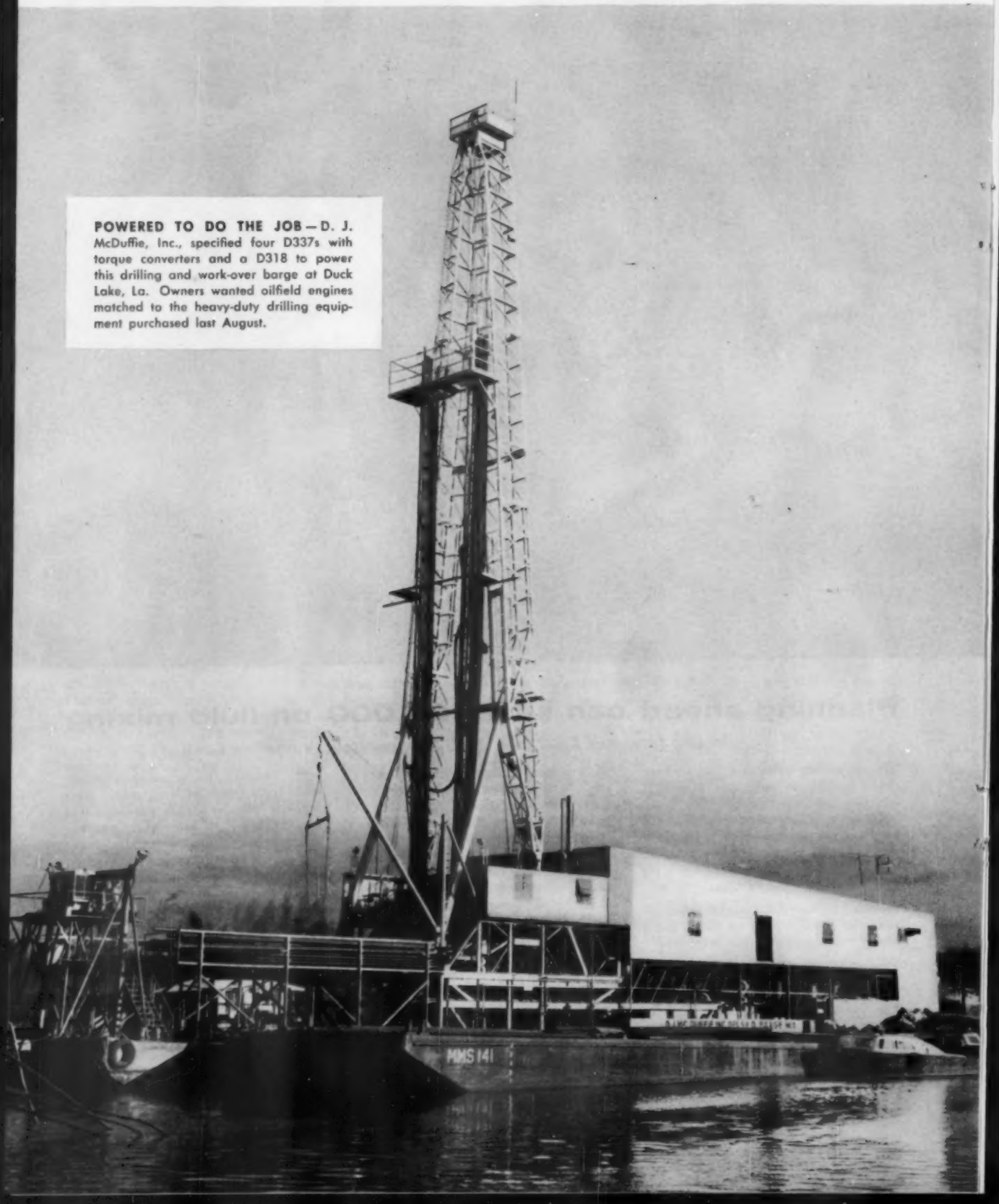
A drilling and work-over rig gets the



POWERED TO DO THE JOB—D. J. McDuffie, Inc., specified four D337s with torque converters and a D318 to power this drilling and work-over barge at Duck Lake, La. Owners wanted oilfield engines matched to the heavy-duty drilling equipment purchased last August.

"power to do the job"–5 CAT Diesels

When D. J. McDuffie, Inc., Plaquemine, La., equipped a new drilling and work-over barge, it wanted engines with the "power and speed to do the job." That's why modern, heavy-duty Cat Oilfield Engines were specified.

As the barge reworks Duck Lake wells in Louisiana, four D337s with torque converters and Ideco compounds drive Ideco drawworks and Gardner-Denver mud pumps. In addition, a D318 drives an Oilwell high-pressure pump. The four D337s are equipped with a keel cooling system.

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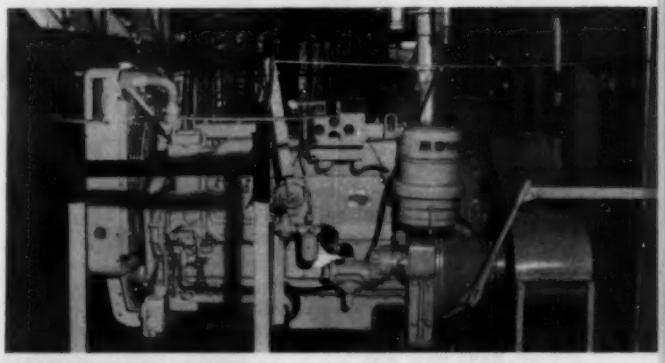
Modern, heavy-duty engines featuring a four-cycle design give you smooth, efficient power. The Cat torque converter automatically adjusts to changing load conditions.

You can choose your power equipment from a full line of Cat Oilfield Engines, available with up to 650 HP (maximum output capacity). These units are also available as diesel and spark-ignition electric sets from 30 to 350 KW (continuous).

So, when you're selecting oilfield equipment, be sure you get the most modern power available by specifying Caterpillar Oilfield Engines. And for replacement power, see your Caterpillar Dealer. He knows the problems of the oilfield.

Engine Division, Caterpillar Tractor Co., Peoria, Illinois, U. S. A. Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

FOUR CAT D337 ENGINES with torque converters drive Ideco drawworks and Gardner-Denver mud pumps through an Ideco compound. McDuffie, Inc., switched to Cat Oilfield Engines last August when the new rig was purchased.



THIS D318 DIESEL drives an Oilwell high-pressure mud pump for McDuffie's operations at Duck Lake, La. Like all engines on the rig, it is expected to operate 24 hours a day, the year around.

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done. The same Devonian beds that outcrop along the fringe of the outer Blue Grass are over 4,000 ft. deep in the subsurface of extreme eastern Kentucky.

• **Silurian:** In eastern Kentucky the Silurian has two main facies, not further differentiated in the subsurface. For practical purposes the Silurian may be considered to be dolomite and clay shale in the western part, where it is sometimes included in the Corniferous (Siluro-Devonian) group. Elsewhere in eastern Kentucky and particularly in the northeast, the Silurian is represented by quartzitic conglomerate, known to the driller as the "Big Six" formation. Because litho-facies studies have not been made, full areal extent of the Big Six is not known. This formation has produced gas in eastern Kentucky. Because its geology is little understood, it could be an important gas producer when more is learned about Big Six petrology and stratigraphic relations.

• **Ordovician:** Upper and Middle Ordovician, to the writer's knowledge, have never produced hydrocarbons in eastern Kentucky. Since few tests have penetrated this monotonous sequence of limestone, little can be said of these beds except that they generally have poor reservoir characteristics. Post-St. Peter limestone has a thickness of some 1,500 ft. in eastern Kentucky, and is not differentiated in the subsurface. At least no standard nomenclature exists for the several stratigraphic units included.

• **Knox group and St. Peter sandstone:** The Knox group, in the few places it has been penetrated, has the same lithologic characteristics as its epicontinental equivalents, the Arbuckle, Ellenburger, etc. All noncalcareous dolomite, cherty and arenaceous in part, the Knox is locally porous. It underlies one to several hundred feet of St. Peter sandstone.

In December 1956, commercial Knox oil was discovered on the Rock Castle River uplift in east central Laurel County at a depth of 3,530 ft. This well was the Oliver Jenkins 1 Durham, and had an initial potential of 35 bbl. of oil per day. Gas from the Knox was produced earlier in the same vicinity and some Knox oil was found in Wayne County in 1939. Although production from this pool has been disappointing, it has provided a basis on which to explore further the Knox dolomite throughout southeastern Kentucky. In the past, unfortunately, most of the few Knox tests have been poorly located with respect to structure. The recent United Fuel Gas Corp. test in central Leslie County was dry at 6,000 ft. (in Knox strata), and proved to be drilled on a simple monocline.

Countless Knox prospects for oil and gas exist at depths ranging from less than 3,000 ft. to more than 6,000 ft. As more Devonian mapping is done, Knox prospects become more abundant. Yet none of the good structures are being tested.

The Red Bird anticline . . . An excellent Knox prospect in southeastern Kentucky is the Red Bird anticline of northeastern Bell County, where localized uplift on top of the Devonian (Corniferous) dolomite has some 200 ft. of closure (see Fig. 2). This structure stands out as the biggest known subsurface closure in three counties of southeastern Kentucky, and there is a real possibility that it possesses added closure on the Knox horizon as a result of possible pre-St. Peter uplift.

The Red Bird anticline has not been tested below 3,500 ft., where gas was discovered in the Corniferous in 1930. In this particular area the top of the Knox is estimated at 5,200 ft., varying slightly with topographic relief. Shows of oil were encountered in one of the four tests drilled on the Red Bird anticline, in the basal Big lime section.

The Future

Exploration in new geologic provinces is becoming more expensive, and as oil and gas become more difficult to find, fewer operators figure in the final payout. At the same time underdeveloped areas of the east, such as eastern Kentucky, are left to slow development with little of the talent and organized thinking of America's experienced geologists and engineers.

Why is this? Most of the petroleum geologists of the United States, including men working in the central interior basin, have a passive attitude toward sedimentary geology east of the Cincinnati arch and tend to associate this area with the Appalachian complex. This is equally true of geologists educated in the east, and now working elsewhere. Careful examination of the geologic map of the eastern United States will repudiate any such notion. In fact, many more tests west of the Mississippi River have been drilled in or near diastrophic "danger" areas.

Geologists new to Kentucky are impressed at the extent to which structural and stratigraphic conditions favor oil and gas accumulation in eastern Kentucky. Older gas-company geologists have always maintained a steady interest in the development of this region.

Among the geologists possessing broad regional understanding of the continent, including the Appalachian shelf of eastern Kentucky, few have been successful in convincing management that real possibilities exist here. Consistently high returns from Mid-Continent and Texas drilling have been a factor in the past, but the inability of geologists to promote more exploration in eastern Kentucky, is mostly due to discouraging results of too few, poorly located wildcats. Also, eastern Kentucky has long had the reputation of being "just gas country."

Eastern Kentucky has a good future oil-producing potential, as indicated by recent discoveries. But even if no oil were found in the future, proximity of this area to new eastern markets has made gas "golden." High-grade coal, for which eastern Kentucky is famous, is no longer competing with the gas industry. Gas is the new hope for industrial development of the eastern Kentucky wilderness.

Although many tests have been drilled in eastern Kentucky, subsurface information is wanting. In the past, independent operators often drilled wells without location according to scheme, and without saving samples. Accurate property maps are largely nonexistent. As of January 1958, only two rotary tests had been drilled in eastern Kentucky, and the writer has never seen an electric log from the entire area. Seismic exploration is something rather recent, although naturally the amount done is unknown to the public.

All this works hardship on the exploration geologist; but the situation is improving rapidly. Samples are piling up, and in the near future the Kentucky Geological Survey will be able to supply new 1:62,500 base maps over the entire eastern Kentucky shelf. With the increasing supply of maps and subsurface information it is now possible for the first time to attempt regional structural and stratigraphic analysis of this passed-over producing area. For example, the litho-facies maps of the Big lime, if superimposed over structure, would certainly increase the success ratio of Big lime tests. When more is learned about the subsurface of eastern Kentucky there will be new oil and gas, cheaper to produce, and close to expanding retail markets of the eastern United States.

"Only two rotary tests have been drilled in eastern Kentucky."

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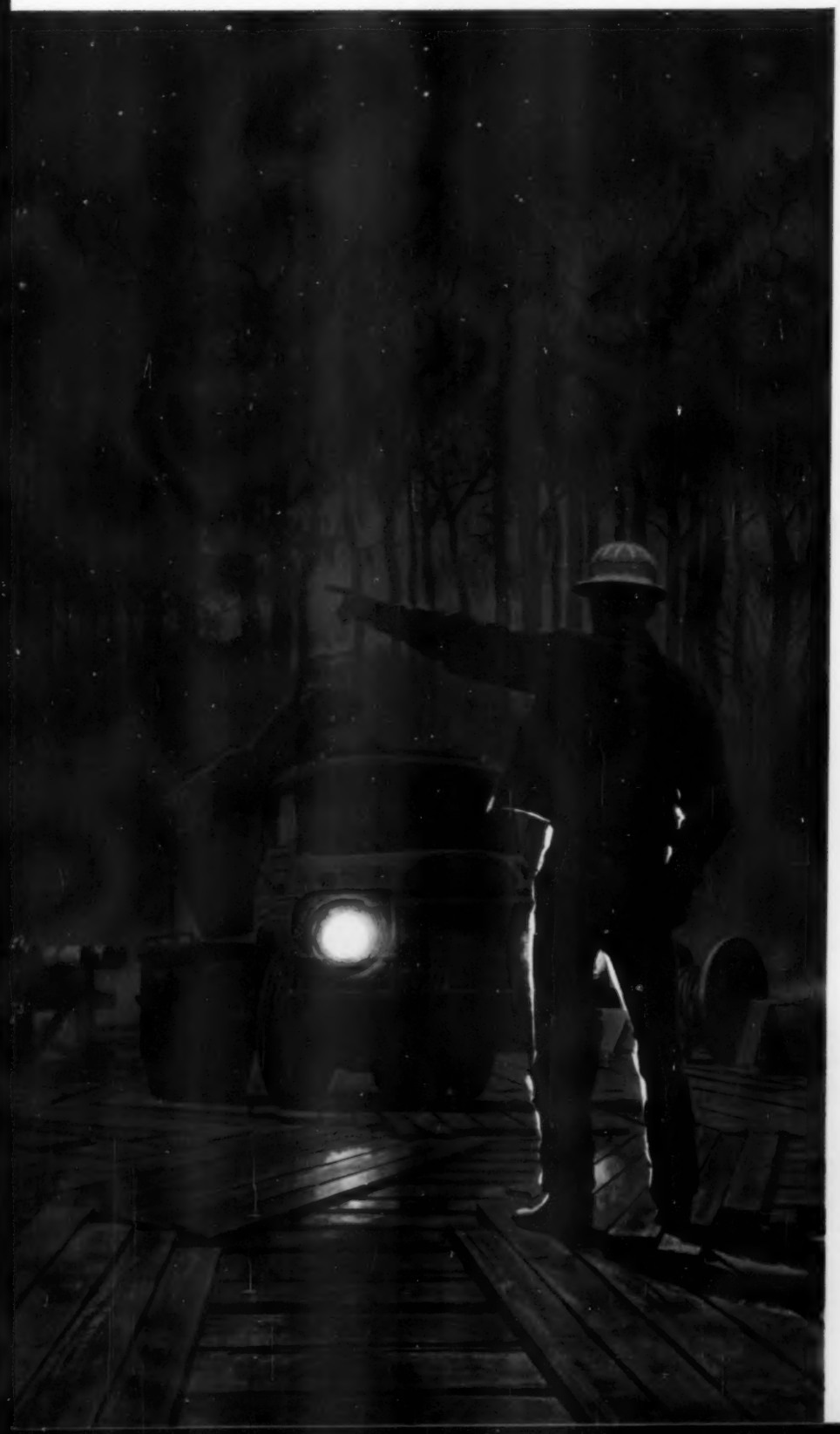

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As the Bonanza leaves the runway, the stout thrust of power tells him that here is an airplane second to none. Relaxed and comfortable in the Bonanza's quiet cabin, he can restfully study out the job ahead. He arrives fresh and ready—a top man in top condition.

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For information about the **Bonanza** and the finest leasing and financing plans in aviation, see your Beechcraft distributor or dealer, or write Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.

Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

Michigan reef hit sparks new starts

ANNOUNCEMENT of Glen Mills and Basin Oil Co. 2 Waltos, SE SE NW 22-4n-15e, Casco Township, St. Clair County, flowing 25 bbl. oil per hour from 16/64-in. choke out of Niagaran reef pay, will trigger at least eight new starts in area.

First substantial oil well in 6-year old play, 2 Waltos flowed up to 82 bbl. day after 2,000-gal. acid treatment and raised to top of 69 bbl. per hour on 30/64-in. choke after 600 bbl. oil and 20,000 lb. sandfrac at 2,626-38 ft. perforated zone.

Sun Oil Co., McClure Oil Co., Mills and Basin and Fisher & McCall, Inc., announced immediate starts in area.

Abandoned Ohio area reopened

COMPLETION of 2 A. B. Beardmore, north of Mount Perry in Section 5, Madison Township, Perry County, has been announced by Shulman Brothers.

Clinton sand was topped at 3,093 ft. and drilled in to 3,141 ft. where the gage was 3,200 M.c.f. and 5 bbl. oil natural. The area is adjoining a gas field abandoned many years previous.

Pennsylvania Shallow Well Completion Statistics for Second Quarter of 1958

County	Oil†	Gas	Water input	Gas input	Dry holes	Storage wells
Armstrong	.....	22- 69,604	.....	.....	2- 6,584	.....
DD*	.....	1- 330	.....	.....	.....	.....
Clarion	.....	5- 13,611	.....	.....	1- 3,001	.....
Elk	.....	1- 2,202	.....	.....	.....	.....
Fayette	.....	.....	.....	.....	1- 1,140	.....
Forest	2- 1,381	.....	.....	.....	2- 2,019	.....
DD*	.....	3- 1,596	.....	.....	.....	.....
Greene DD*	.....	.....	.....	.....	.....	1- 1,044
Indiana	.....	11- 31,999	.....	.....	4-13,398	.....
Jefferson	.....	9- 27,925	.....	.....	1- 2,990	.....
McKean	43-77,668	.....	26-48,217	.....	1- 2,097	.....
Venango	2- 1,755	.....	1- 1,139	2- 1,451	.....	.....
DD*	3- 100	.....	.....	.....	.....	.....
Warren	4- 2,854	.....	.....	1- 622	.....	.....
Washington	.....	1- 2,749	.....	.....	.....	.....
Westmoreland	.....	7- 24,342	.....	.....	.....	.....
Wyoming	.....	.....	.....	.....	1- 3,966	.....
Total	51-83,658	56-172,432	27-49,356	3- 2,073	13-35,195	.....
DD*	3- 100	4- 1,926	.....	.....	.....	1- 1,044

Total new wells drilled during second quarter in Pennsylvania	150
Total footage of new wells	342,714
Total wells drilled deeper	7
Total footage of wells drilled deeper	2,026
Total new storage wells	0
Total storage wells drilled deeper	1
Total footage of storage wells drilled deeper	1,044
Total footage of all wells	345,784

*Drilled deeper.
†First number before dash indicates number of wells.

Successful Wildcats

ALBERTA

Union Oil Co. of California 10-13-87-8 Red Earth Creek, LSD 10, 31-87-8w5. Granite wash oil well. TD 4,885 ft.

BRITISH COLUMBIA

Phillips Petroleum Co. B-1 Kobes, Unit 99 Zone A N.T.S.I. Map 94-B-9. Triassic gas discovery. TD 7,472 ft.

MISSISSIPPI

Adams County: Marlin Exploration, Inc., 1 Brown, 39-6n-3w. IP 160 BOPD, 3/16-in., 42.6°, GOR 400 cu. ft. per bbl., TP 275 psi., perforations 4,815½-17½ ft. (Wilcox). TD 7,011 ft. Elev. 238 ft., Wilcox 4,517 ft., base Baker shale 6,372 ft. (Discovery well of Anchorage field.)

Jefferson Davis Parish: Gulf Oil Corp. 1 Gwinville Unit, 1, 34-9n-19w. IP 1,948 M.c.f. daily, 50.75 BCPD, 4.06 BWPD, ½-in., 53.7°, TP 1,200 psi., perforations 13,200-20 ft. and 13,252-60 ft. (Rodessa). TD 14,542 ft. Elev. 516 ft., Lower Cretaceous 9,340 ft., first Rodessa sand 13,197 ft., Hosston 14,150 ft. (Rodessa discovery well in Gwinville field.)

Walthall County: Skelly Oil Co. and Kin-Ark Oil Co. 1 Joe Pittman, 6-1n-13e. IP 124.15 BOPD, 13.79 BWPD, 5/32-in., 33°, TP 700 psi., perforations 9,640-44 ft. (Lower Tuscaloosa stringer sand). TD 15,939 ft. Elev. 331 ft., Lower Tuscaloosa 9,462 ft., Massive 9,740 ft., Lower Cretaceous 9,990 ft., Ferry Lake Andrite 14,222-14,310 ft. (New pay and first oil production in Dexter field.)

SOUTH LOUISIANA

Calcasieu Parish: W. W. F. Oil Corp. et al 1 Anderson, 32-8s-9w (6 miles northwest of Lake Charles). IP 89.5°, BOPD (net), 12% b.s. and w., 3/16-in., 49.8°, GOR 39,162 cu. ft. per bbl., TP 5,152 psi., perforations 8,790-93 ft. TD 9,501 ft. (New field discovery.)

Lafourche Parish: R. Mosbacher and Continental Oil Co. 1 Libby-Blouin, 97-15s-17e. IP 2,050 M.c.f. daily, 80.5 BOPD (net), 21% b.s. and w., 3/16-in., 51°, TP 4,000 psi., perforations 12,993-49 ft. TD 13,048 ft. (New field discovery—3½ miles northeast of Rousseau field.)

St. Charles Parish: California Co. 5 Timken, 36-14s-22e. IP 5,113 M.M.c.f. daily and 51 BOPD, ½-in., 47.7°, TP 3,460 psi., perforations 10,016-33 ft. TD 11,855 ft. (New pay in Couba Island field.)

St. Martin Parish: Kerr-McGee Oil Industries, Inc., 1 La Rose, 19-9s-8e, (3 miles east of Section 28 field.) IP 5 M.M.c.f. daily, ¼-in. GLR 66.6 M.c.f. per bbl., 48°, TP 3,400 psi., perforations 12,555-75 ft. and 12,584-90 ft. TD 13,045 ft. (New field discovery.)

St. Mary Parish: British-American Oil Producing Co. 1 Terrebonne Unit D, 23-16s-13e. Shut-in gas well, no gage, perforations 14,482-14,576 ft. TD 15,407 ft. (New pay in Ramos field.)

Vermilion Parish: Charles B. Wrightsman 1 Petry, 1-11s-1e. IP 132 BOPD, ⅛-in., 34.4°, GOR 700 cu. ft. per bbl., TP 950 psi., perforations 9,927-36 ft. TD 11,475 ft. (Second well and new pay in Perry Point field.)

WEST TEXAS

Crane County: Bell Petroleum Co. 5 Renaud, 19-1-H&TC, ½ mi. SW Abell (Silurian) field. IP 168 BOPD, ½-in., 33°-gravity, GOR 250, TP 50 psi., Glorieta 3,208-16 ft. TD 5,146 ft.

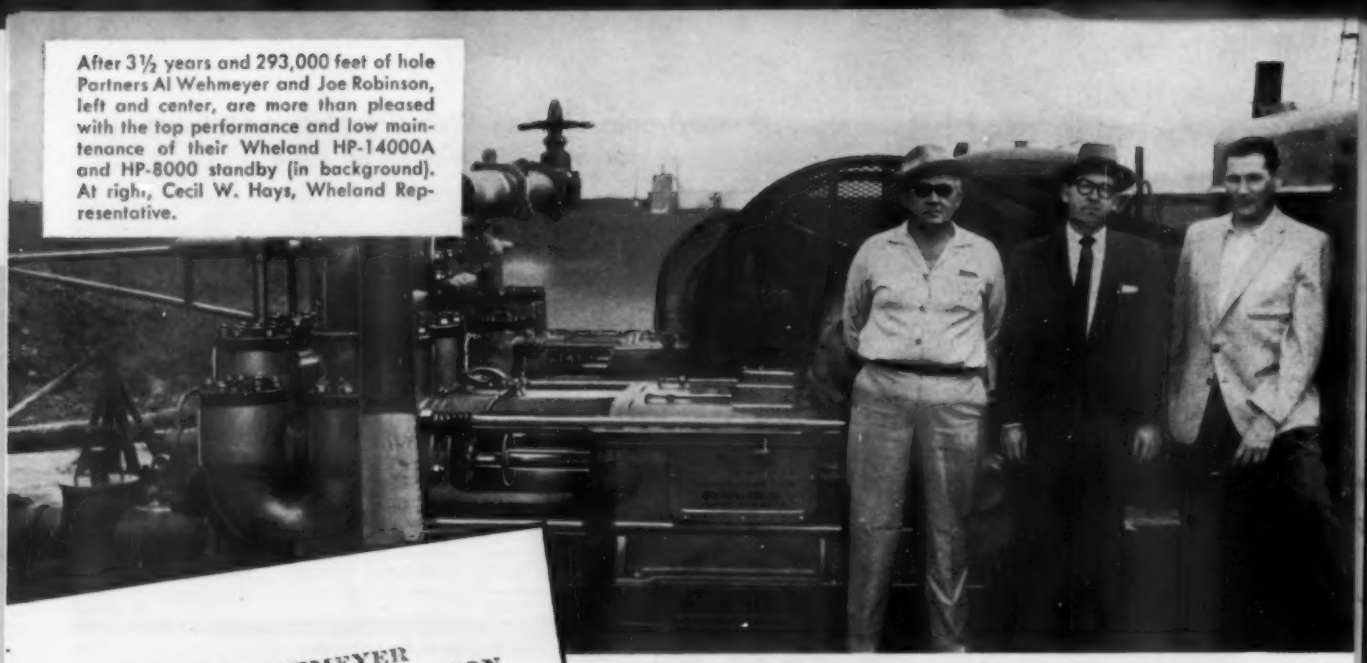
Gulf Oil Corp. 570 Waddell, 30-B26-PSL, new pay discovery in Sand Hills-Tubb field. IP 225 BOPD, 20/64-in., 25°-gravity, GOR 325, TP 110 psi., Ellenburger 5,750-85 ft. TD 5,803 ft. ground elev. 2,616 ft.

Culberson County: C. B. Ridgeway et al 1 W. A. Scott estate, 8-113-PSL, 18 mi. SW Orla. IPP 132 BOPD, 34°-gravity, GOR 140, Delaware 2,001-11 ft. TD 2,053 ft.

Dawson County: Midwest Oil Corp. 1 Davis, 60-M-EL&RR, 12 mi. NW Lamesa. IP 407 BOPD, 20/64-in., 42°-gravity, GOR 480, TP 225 psi., Pennsylvanian 8,491-97 ft. TD 8,520 ft., ground elev. 3,071 ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Pursuant to the provisions of Public Land Order 1621 dated April 18, 1958, notice is hereby given that approximately 16,000 acres of land situated on the Gubik gas field, Alaska, lying north of the Brooks Mountain Range are being offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 P. M., E.D.T., on September 3, 1958. This acreage will be offered in separate parcels of designated leasing blocks not exceeding 640 acres as shown on the leasing map of the Gubik gas field. This map of the Gubik gas field, as well as maps of the surrounding lands which are subject to noncompetitive leasing, is contained in a map portfolio which will be available for examination or purchase at $1.50 per portfolio at the Land Offices, Anchorage and Fairbanks, Alaska, and at the Bureau of Land Management, Interior Building, Washington 25, D. C. Details of the lease offer, how and where to submit bids may be obtained from either of the offices named. (Edward Woozley, Director, Bureau of Land Management, Washington 25, D. C.)



After 3½ years and 293,000 feet of hole Partners Al Wehmeyer and Joe Robinson, left and center, are more than pleased with the top performance and low maintenance of their Wheland HP-14000A and HP-8000 standby (in background). At right, Cecil W. Hays, Wheland Representative.

ROBINSON-WEHMEYER
DRILLING & EXPLORATION

5123 BROWNCROFT HOUSTON 21, TEXAS

March 31, 1958

Mr. Gordon P. Street, Pres.
The Wheland Company
Signal Mountain Road
Chattanooga, Tennessee

Dear Mr. Street:

During the past 3-1/2 years our Wheland HP-14000A pump and Wheland HP-8000 standby have made some 293,000 feet of hole. Service and repair expense have been nominal and we are more than pleased with these pumps.

Our operations are in the Texas Gulf Coast area. We drill in depths from 3,000 to 6,000 feet on contract, interest deals and for our own account and we can always depend on our Wheland pumps for a good job under all drilling conditions.

Very truly yours,

Joe Robinson

Joe Robinson

WHELAND

DUPLEX SLUSH PUMPS

Always do a Good Job!

"...can always depend on our Wheland pumps for a good job under all drilling conditions."
—Mr. Joe Robinson

HP-14000—7½" x 14", 350 HP Nominal Input at 60 RPM. Discharge Pressure with 7½" liner 838 PSI; with 5½" liner, 1627 PSI.

HP-8000—7¼" x 12", 220 HP Nominal Input at 70 RPM. Biggest little pump on the market!

DEPENDABLE SERVICE . . . LOWER MAINTENANCE

Write today for detailed bulletins on the Complete Line of Wheland Slush Pumps

WHELAND

ROTARY DRILLING MACHINERY

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DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC.—Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC.—Main Office: Houston, Texas • JONES AND LAUGHLIN STEEL CORPORATION, SUPPLY DIVISION—Main Office: Drawer 2481, Tulsa 2, Oklahoma.

EXPORT DISTRIBUTORS: LUCEY EXPORT CORPORATION—233 Broadway, New York 7, New York—Broad Street House, London, E. C. 2, England.

NEW JOB in Houston for Texas Gulf Producing, but still . . .

Borrego Roams World for Oil

AFTER SPENDING nearly 30 years roaming foreign oil fields, 52-year-old Edward C. Borrego has settled down in a Houston office as vice president of Texas Gulf Producing Co.

Although Texas Gulf's principal interests are in domestic oil, Borrego will retain his status as an international oil man.

He has just returned from a trip to Peru. There he inspected holdings of Ganso Azul Cia. de Petroleo, in which Texas Gulf has controlling interest.

Last week he had just returned from another inspection trip to Brazil.

When the time looks right, Borrego probably will return to presently booming Libya in North Africa where he was in charge of activities for Libyan American Oil Co., wholly owned subsidiary of Texas Gulf.

Jersey student . . . Borrego grew up in the world wide Jersey Standard organization.

Back in 1927 he became one of the first technical students ever recruited from a college campus by Standard of Jersey. When Jersey beckoned, Borrego was in his third year at Colorado School of Mines where he was studying mining and geology.

Borrego quit school to heed the call. He went to Mexico as "sort of a well-watcher" for Jersey's Mexican affiliate, Huasteca Petroleum Co.

By 1938 Borrego had become assistant production manager at Tampico. Then Jersey, along with other foreign companies, was expropriated by the Mexican Government. Borrego, as top local man for the company, landed in jail when he refused to sign the expropriation papers. He was released a couple of days later following the intervention of U. S. Ambassador Josephus Daniels in Mexico City.

Borrego was transferred to Tulsa and assigned by Carter Oil Co. to the Loudon field then being developed in Illinois.

After about a year in the States, Borrego was transferred to Venezuela as field superintendent in the Quiriquire and Jusepin division of Standard Oil of Venezuela, now Creole Petroleum Corp.

Early in 1943 he joined the U. S. Army as a captain and was assigned to the petroleum section of Allied Forces Headquarters in the Algiers area. He was in charge of tanker movements and oil storage for the Mediterranean Theater of War.

Landing in Italy soon after the Salerno invasion, Borrego remained there until the war was over. Then he was placed in charge of civilian distribution of petroleum products.

Government official . . . Following a short assignment in Jersey's New York office, he returned to Italy at the request of the State Department and became petroleum attache in the Rome embassy.

While there he participated in a transfer of oil properties which represented the reverse of the procedure he had witnessed in Mexico nearly a decade earlier. As an official of the State Department, Borrego was in charge of returning to foreign oil companies in Italy properties which had been confiscated by Mussolini.

Borrego was on loan to the State Department from September 1945 to October 1946. Then he remained in Italy as president and general manager of Jersey's Italian affiliate, Societa Petrolifera Italiana, which he headed until 1950.

Leaving Italy, Borrego returned to South America—this time as assistant manager of International Petroleum Co. in Peru. In 1951, he went to Colombia as executive representative and general manager of the four Jersey affiliates there.

In Colombia, Borrego was a central figure in a third important transfer of property between a government and private enterprise. He was in charge of International Petroleum when its De Mares concession reverted to government ownership, according to terms of the concession, after it had been held for 30 years.

In 1955 Borrego transferred back to Venezuela and was put in charge of executive development for Creole.

He left the Jersey family in January 1956 to become general manager of Libyan American, then preparing for its first drilling venture in Libya. He was promoted from vice president of the subsidiary to vice president of the parent company, Texas Gulf Producing, effective July 1.

World citizen . . . Borrego was born in southwestern Colorado.

He and his wife, now in the process of furnishing a new home in Houston, also maintain a home in Wisconsin.

They started building the Wisconsin home 5 years ago and haven't completed it yet, but to world-traveler Borrego, "It's a piece of heaven." Last year, although spending most of their time in Libya, they added a swimming pool at their Wisconsin place. This year, they've been doing some redecorating.

Borrego is of Spanish descent. His wife, the former Maryann Mohrbacher, is what he describes as a "good, square-headed Dutchman." She was born in Kansas and later moved to Wisconsin. They met in Washington while both were with the State Department. They married in Rome in 1946.

They have five children, each of whom can speak at least three languages—English, Spanish, and Italian. (Borrego also can speak French in addition to the others.)

Two of the Borrego children were born in Italy, one in Peru, and one in

Personals

Colombia. Only the oldest was born in this country.

In moving back from Libya, Borrego temporarily gave up one of his favorite hobbies — horseback riding. He had two Arabian horses at his disposal in Libya.

He long ago decided he was a "dud" at golf and has just about given up the game. Even while flitting back and forth across the globe, he still finds time to do a lot of reading. He reads the classics, biographies, history, shoot-'em-ups, and, according to his own testimony, the labels on tomato cans, or nearly anything else legible.

As a public service to its readers, the Journal passes along the information that Borrego admits poker playing is his most expensive hobby. A word of caution: He admits also that it's his favorite.

●

WARNER

Rawleigh Warner, Jr., manager of the economics department of Socony Mobil Oil Co., Inc., has been named manager of the Middle East affairs department. He succeeds **Arnold Stebinger,** who has been given a special assignment in overseas operations. Warner will be succeeded by **Thomas W. Phelps,** assistant to the chairman of the board. **Paul Wollstadt** succeeds Phelps.

Dysart E. Holcomb has resigned as president of Texas Western College, El Paso, to join El Paso Natural Gas Co. as director of research and development.

L. A. Morrison has been appointed district superintendent in Pampa, Tex., for Humble Pipe Line Co. He succeeds **H. V. McCorkle,** who has retired.

Thomas F. Mika, who has been on a 2-year assignment with Shell Chemical Corp.'s chemical-sales division in New York, has rejoined Shell Development Co.'s Emeryville, Calif., research center. He has been named assistant head of the product-development department. Mika was acting assistant head of the plastics and resins department at Emeryville before being transferred to New York.

Claude Hall, vice president of B. B. Smith, Inc., Midland, Tex., has been named president of LaMance Drilling Co., affiliate of Aeco Corp.

Nolan Stewart, former marine superintendent for Brown & Root, Inc., has been named assistant to the vice president of Zapata Off-Shore Co.

L. F. Shiplet, manager of The Texas Co.'s West Texas production division in Fort Worth, has been transferred to Dallas as division manager. **J. H. Markley,** assistant general manager of the domestic producing department at Houston, will succeed Shiplet.

J. B. Christian, The Texas Co.'s vice president in charge of Trinidad operations, has been given additional responsibility as manager of the foreign producing department (Western Hemisphere and West Africa).

Robert Benson, administrative assistant in the Caracas office of Signal Oil Co., operator for the Signal-Pure-Hancock-Ohio Standard group in Venezuela, will return to Pure Oil Co. operations in the United States. He will be legal representative on a Texas unitization project.

John M. Sprague, Carter Oil Co. vice president, will go on leave of absence September 1 to become deputy assistant secretary of defense. His appointment is not to exceed 2 years. Sprague has been Carter vice president in charge of manufacturing and marketing in Billings, Mont., since 1956.

Ralph C. Graham, senior vice president of Tennessee Gas Transmission Co., has been named president of Middle States Petroleum Corp. He succeeds **Philip C. Dixon,** who has resigned. TGT recently acquired 91% of Middle States' common stock. Named to the Middle States board were **Gardiner Symonds,** president of TGT, chairman; **Harold Burrow,** first vice president and assistant to the president of TGT; **R. R. Dean, Cecil C. Johnson,** and Graham, TGT senior vice presidents. TGT executives named officers of Middle States include Johnson, who will be vice president and treasurer; **S. C. Oliphant, W. E. Scott, Roy S. Randerson,** and **W. D. Walser,** appointed vice presidents; and **James E. Ivins,** secretary. **W. H. Blackburn** will remain as a vice president of Middle States. **John Kovach** will continue as controller. **G. B. Leighton,** formerly secretary and treasurer becomes assistant secretary.

W. A. M. Greeven, deputy coordinator for marketing for Standard Oil Co. (N. J.), has been appointed shareholder representative for Jersey affiliates in Italy, Austria, and Switzerland, effective November 1. He succeeds **Ralph P. Bolton,** who is retiring. **M. W. Johnson,** president of Esso Standard do Brasil, Inc., since 1948, will succeed Greeven. **C. J. Griffin,** vice president of the Brasilian marketing company, will replace Johnson as president October 1.

GREEVEN

JOHNSON

Harold M. Dunson, assistant operating superintendent, production department, in Pan American Petroleum Corp.'s Tulsa office, has been appointed assistant district superintendent in Houston. He succeeds **Richard M. Darling,** who has been promoted to Lafayette, La., district superintendent. Dunson has been with Pan American since 1935.

R. H. Martin, Rocky Mountain division geologist for The Texas Co., has been transferred from Denver to New York, where he will be secretary of the executive producing committee. **Ferris Moyer,** assistant Louisiana division geologist, will succeed Martin in Denver. In other changes, **Russell Griswold,** assistant Rocky Mountain division geologist, moves to New York as staff geologist. **P. W. Gaines,** Salt Lake City district geologist, has been transferred to Lewistown, Mont., in the same capacity. **Dale A. Hauck,** formerly in Casper, Wyo., will succeed Gaines in Salt Lake City.

Ben Moreell, chairman of the board of Jones & Laughlin Steel Corp., will retire September 30. He will continue as a director and member of the executive committee. **Avery C. Adams,** president of J&L, will succeed Moreell. Adams will continue as president and chief executive officer. Moreell, retired U. S. Navy admiral, was wartime commander of the SeaBees. He joined Jones & Laughlin in 1947 as president and chairman of the board. His title became chairman and chief executive officer in 1952. Adams joined J&L in 1956 as president. He succeeded Moreell as chief executive officer last year.

Personals

McCOLLUM

E. V. McCollum, senior partner of E. V. McCollum & Co., Tulsa, has been elected president of the Society of Exploration Geophysicists. Other newly elected officers are **William M. Erdahl,** Skelly Oil Co., Tulsa, vice president and **Robert Dyk,** Tidewater Oil Co., San Francisco, secretary-treasurer. **Dr. L. Y. Faust,** Amerada Petroleum Corp., Tulsa, will continue as editor. Executive committee members are McCollum, Erdahl, Dyk, and Faust, and **O. C. Clifford, Jr.,** Atlantic Refining Co. Dallas. Clifford is immediate past president of SEG. The new officers will be installed at the society's annual meeting October 13-16 in San Antonio.

J. A. Hall, Jr., Roswell, N. M., district geophysicist for Sinclair Oil & Gas Co., has been promoted to division geophysicist in Midland, Tex. He succeeds **John B. Etnyre,** who has joined a North African Sinclair affiliate.

W. D. Hamm, Atlantic Refining Co., Dallas, and **Lewis G. Weeks,** Westport, Conn., consultant, have been nominated for president of American Association of Petroleum Geologists. Officers will be elected by mail ballot and the new slate will take office during next year's annual meeting. Other nominees are **Alfred H. Bell,** Illinois Geological Survey, and **Leo R. Newfarmer,** Shell Oil Co., nominees for vice president; **Harold T. Morley,** Pan American Petroleum Corp., and **George C. Grow, Jr.,** Transcontinental Gas Pipe Line Corp., nominees for secretary-treasurer. Candidates for editor are **Daniel A. Busch,** Tulsa consultant, and **Grover E. Murray,** Louisiana State University.

E. A. Schiffers, operations engineer in Andrews, Tex., for Pan American Petroleum Corp., has been promoted to district office operations engineer in Midland, Tex.

E. R. Downs, Ohio Oil Co.'s assistant division production superintendent in Shreveport, La., has moved up to division production superintendent. He succeeds **R. W. Fawcett,** who has retired.

Donald K. Hedeen has been named head of the general planning and economics section in Esso Research & Engineering Co.'s planning engineering division. He has been on assignment in Cuba with an affiliate.

J. Curtis McCarthy, Rocky Mountain division engineer with Pan American Petroleum Corp., has been named assistant Rocky Mountain division production superintendent. He has been with the company since 1940.

HILLS

Liston F. Hills, assistant chief engineer for Aramco Overseas Co., will move up to vice president and chief engineer October 1. He succeeds **Ernest K. Schulze,** who is retiring. Hills joined Standard Oil Co. of California in 1937. He moved to Arabian American Oil Co. in 1946 and to its subsidiary, Aramco Overseas, in 1955. Hills will continue to headquarter in The Hague.

Julian S. Burrows, manager of Humble Oil & Refining Co.'s marine department, has retired. He will be succeeded by **Norman B. Avenell,** assistant manager of the department since 1953. Burrows joined Standard Oil Co. (N. J.) in 1920 and Humble in 1921.

Hamilton Rogers, formerly president of Rowan Oil Co., Fort Worth, has been elected a vice president of Texas Pacific Coal & Oil Co. Texas Pacific purchased assets of Rowan Oil last month. Rogers had been with Rowan Oil since 1941. He is immediate past president of American Association of Petroleum Landmen.

Wayne H. Lee, Canadian supervisor for Robert R. Ray Co., Houston, has been named geophysical supervisor of the company's new Bakersfield, Calif., office.

Benjamin K. Ayers, Jr., engineer in Pan American Petroleum Corp.'s Houston division office, has been transferred to New York with Pan American International Oil Co.

W. A. (Bill) Dunham, mechanical supervisor in Houston with Texas Butadiene & Chemical Corp., has been named mechanical superintendent at Callery Chemical Co.'s new Muskogee, Okla., plant.

Harold T. Hornford, assistant chief geologist in Calgary for Richfield Oil Corp., has been appointed chief geologist. He replaces **Walter Record,** who is returning to the company's Los Angeles office.

Kenneth N. Hostler, engineer-in-charge at Ohio Fuel Gas Co.'s Lucas, Ohio, compressor station, has been promoted to chief engineer. He succeeds **Merlin M. McInturf,** who was recently named southern compressor division superintendent.

DEATHS

Herschel B. Hamilton, 73, pioneer Oklahoma independent producer, died August 9 in a Sapulpa, Okla., hospital. Hamilton entered the oil business in the early 1900s. He was owner of the first Jenks, Okla., gas company, and was active in developments in Texas' Burkburnett field and Oklahoma's Glenn Pool.

W. E. Moody, 74, retired vice president of Deep Rock Oil Corp., died July 31 in Cushing, Okla., after a heart attack. Moody was refinery superintendent in Independence, Kans., for Consumers Products Co. before joining Deep Rock in 1917 as superintendent of the company's Cushing, Okla., refinery. He was named a vice president in 1929. He retired in 1949. Assets of Deep Rock were purchased by Kerr-McGee Oil Industries, Inc., in 1955.

Fred Sehman, 69, Wichita Falls, Tex., executive secretary of Stripper Well Association, died recently in Denver.

Kyle C. Smith, 55, Tulsa, field purchasing agent for O. R. Burden Construction Corp. for 5 years, died August 2 in Muncie, Ind., after a heart attack. Smith was formerly with Stanolind Pipe Line Co. and Richfield Oil Corp.

Charles M. Ross, 60, retired Amerada Petroleum Corp. geophysicist, died August 3 in a Tulsa hospital after a long illness. Ross joined Amerada in 1931 after working with Rycab, Dixie, and Pan-American oil companies. He retired several months ago.

Prices depend on August runs

BY JOHN C. CASPER
Economics Editor

AUGUST is a crossroads month for refiners. It's the place where each refiner must stop, read the signs, and decide which way he will go.

The signs that point the way are stock totals, production trends, product demands, and product markets. The market guidepost is a blend of the other three. Changes in demand show up first in product stocks, which makes the stock total for a particular product a sensitive barometer for measuring market pressures.

August is a month of stock increases. The varying volumes added to product storage will influence product prices in the months ahead. Stock comparisons are shown in the tables on this page.

Table 1 gives major product stock totals for the end of July and stock changes during August for all years since the end of Warld War II. In this period, gasoline stocks increased 103% compared with a gain of only 85% in total gasoline demand. Distillate stocks climbed 133% and demand 78%. Residual stocks are 47% higher than in 1946 and demand is up about 4%.

The largest reduction in gasoline stocks normally comes in June with a smaller drop in July and still smaller in August. The ratios are about 225 to 150 to 100.

The big gasoline-stock correction last year was in July when inventories were lowered almost 12,200,000 bbl. High gasoline-stock levels and poor demand forced early reductions this year. Gasoline inventories were cut 34,000,000 bbl. in the 3-month period including April, May, and June.

Latest stock totals prove that adjustments are needed in some areas. Table 2 shows how much major product stocks have changed by districts in the past year and over the last 2 years.

District 2 gasoline stocks are 5,141,000 bbl. above last year and 2,513,000 bbl. higher than in 1956. The smaller increase over 1956 is due to the fact that gasoline stocks were above normal in the summer of 1956.

Residual stocks are much too high on the West Coast.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,540,100	UP	33,600	DOWN	294,275
Crude stocks	248,784,000	DOWN	2,936,000	DOWN	37,038,000
Completions	930	UP	24	DOWN	183
Refinery runs	7,727,000	UP	210,000	DOWN	192,000
Gasoline stocks	178,715,000	DOWN	93,000	UP	2,721,000
Kerosine stocks	25,914,000	UP	576,000	DOWN	5,540,000
Distillate stocks	120,417,000	UP	4,860,000	DOWN	17,813,000
Residual stocks	66,887,000	UP	400,000	UP	17,747,000
Four-product stocks	391,933,000	UP	5,743,000	DOWN	2,885,000
Total imports	1,654,300	UP	359,900	DOWN	39,400

TABLE 1—STOCKS AT THE END OF JULY
(Thousands of barrels)

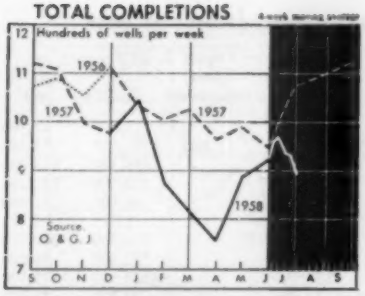
AUGUST STOCK CHANGES
(Thousands of barrels)

	Gasoline	Mid. dist.	Residual	Gasoline	Mid. dist.	Residual
1946	87,778	62,842	45,446	—1,033	10,684	2,740
1947	86,003	64,095	47,600	— 154	11,436	3,734
1948	98,839	79,683	58,431	—3,394	12,699	5,665
1949	111,217	96,379	66,084	—6,338	5,148	759
1950	111,055	84,815	42,165	—3,988	9,414	1,186
1951*	130,931	113,961	45,163	—6,729	12,795	2,080
1952	116,566	113,162	52,245	2,026	23,496	1,816
1953	142,068	132,889	47,966	2,170	21,462	2,041
1954	158,010	133,610	54,365	—4,842	17,868	1,967
1955	157,079	151,918	44,894	—5,167	17,049	586
1956	176,536	144,777	43,958	—3,597	24,954	2,659
1957	177,868	170,072	49,621	—3,837	23,628	3,024
1958	178,715	146,331	66,887			

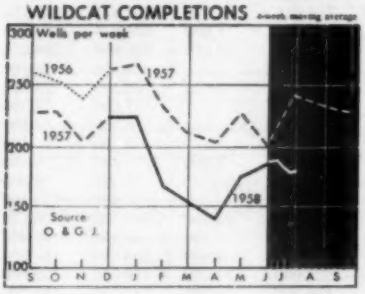
TABLE 2—PRODUCT STOCK CHANGES
Since last year and year before
(Thousands of barrels)

	Gasoline change from		Middle distillate Change from		Residual change from	
	7-31-56	7-31-57	7-31-56	7-31-57	7-31-56	7-31-57
East Coast	1,213	43	— 210	—12,898	1,756	341
Appalachian:						
District 1	— 44	— 294	— 57	— 414	29	10
District 2	— 705	179	— 7	— 622	— 158	130
Ind., Ill., Ky.	2,194	1,791	4,652	239	146	— 330
Minn., Wis., Dak.	— 125	1,288	93	— 135	371	162
Okla., Kans., Mo.	1,149	1,883	238	— 609	— 119	— 7
Inland Texas	— 160	— 276	14	— 682	480	170
Texas Gulf Coast	—2,080	—1,088	—3,806	— 4,829	2,025	1,425
La. Gulf Coast	— 973	—1,601	—1,842	— 3,677	— 195	— 202
N. La. and Ark.	— 12	292	922	276	5	— 10
Rocky Mountain:						
New Mexico	— 35	37	— 8	— 11	— 2	9
Other Rky. Mt.	— 571	— 714	— 322	— 191	24	— 129
West Coast	2,328	— 693	1,887	— 1,432	18,567	15,697
Total U. S.	2,179	847	1,554	—23,741	22,929	17,266
East of District 5	— 149	1,540	— 333	—22,309	4,362	1,569

TOTAL COMPLETIONS



WILDCAT COMPLETIONS



Active Rotary Rigs*

	8-4-58	7-28-58	8-5-57
Alabama	6	6	2
Arkansas	25	16	23
Arizona	....	....	....
California	77	77	110
Colorado	47	51	55
Florida	1	....	....
Georgia	....	1	....
Idaho	....	....	....
Illinois	44	33	40
Indiana	5	5	9
Iowa	3	3	2
Kansas	134	131	156
Kentucky	10	6	13
Louisiana	289	290	420
North	43	44	56
South	205	207	253
Offshore	41	39	111
Maryland	....	....	....
Michigan	13	9	11
Missouri	1	1	1
Montana	19	21	25
Mississippi	37	36	38
Nebraska	27	24	34
Nevada	....	....	1
New Mexico	100	104	180
New York	2	2	....
North Dakota	34	32	29
Ohio	....	....	1
Oklahoma	216	184	277
Oregon	1	1	1
Pennsylvania	10	10	16
South Dakota	1	....	....
Texas	652	608	924
Gulf Coast	146	136	205
Offshore	1	1	4
West	261	251	365
North	194	174	294
East	50	46	56
Tennessee	....	....	1
Utah	32	33	54
Washington	....	....	1
West Virginia	4	4	5
Wyoming	61	60	84
Virginia	....	....	....
Total U. S.	1,851	1,748	2,513
Western Canada	139	153	190
Eastern Canada	2	2	3
Grand total	1,992	1,903	2,706

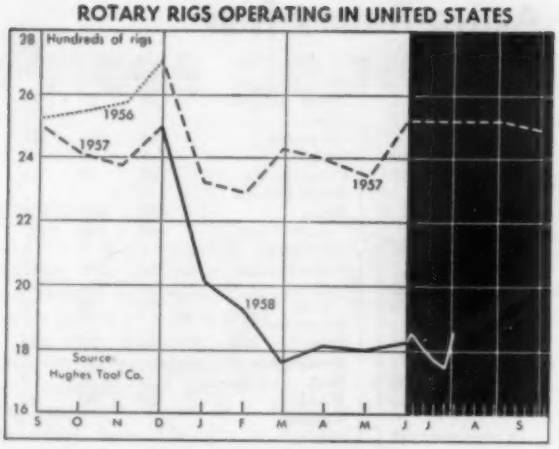
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 2, 1958

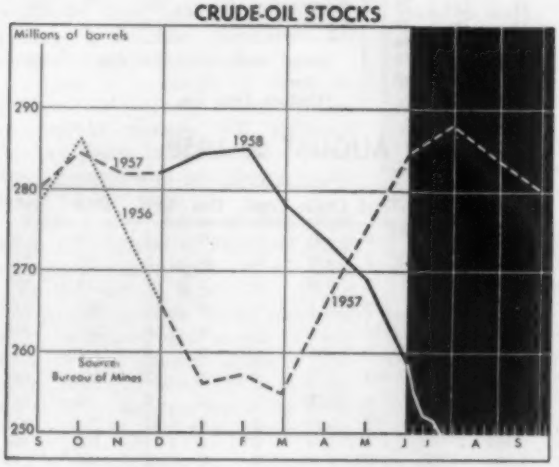
	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	0	0	0	0	0	0	0	42	58	0	0	0	0	0	16	18
Arkansas	7	4	0	0	3	0	21,846	387	628	1	0	0	0	1	97	115
California	25	14	0	2	9	0	120,509	983	1,248	8	0	0	1	7	219	309
Colorado	21	2	0	3	16	0	109,477	451	504	12	1	0	0	11	253	342
Illinois	53	25	0	7	21	0	111,414	1,212	1,424	11	1	0	0	10	241	368
Indiana	15	1	0	0	14	0	26,411	431	358	9	1	0	0	8	160	76
Kansas	77	40	0	5	29	3	262,780	2,185	2,454	15	2	0	0	13	460	487
Kentucky	33	15	0	2	16	0	54,441	632	818	6	3	0	0	3	71	161
Louisiana	68	29	6	3	30	0	607,185	1,954	2,221	12	0	0	0	12	276	401
North	18	6	0	3	9	0	50,336	684	770	7	0	0	0	7	100	106
South	40	18	6	0	16	0	456,521	1,008	1,031	5	0	0	0	5	160	243
Offshore	10	5	0	0	5	0	100,328	262	420	0	0	0	0	0	16	52
Michigan	10	3	0	0	5	2	23,998	247	237	4	0	0	0	4	82	92
Mississippi	7	6	0	0	1	0	78,077	229	216	3	2	0	0	1	111	114
Montana	3	3	0	0	0	0	12,655	195	228	1	1	0	0	0	86	80
Nebraska	16	4	0	0	12	0	100,390	403	510	4	0	0	0	4	186	287
New Mexico	36	19	0	11	6	0	170,614	1,135	1,247	2	0	0	0	2	149	165
West	16	3	0	10	3	0	64,708	541	487	2	0	0	0	2	64	59
East	20	16	0	1	3	0	105,906	594	760	0	0	0	0	0	85	106
New York	10	5	0	0	0	5	13,500	335	268	0	0	0	0	0	32	2
North Dakota	14	7	0	0	7	0	76,033	263	160	5	1	0	0	4	89	66
Ohio	27	10	0	7	9	1	74,400	616	636	1	0	0	0	1	7	7
Oklahoma	93	49	0	4	39	1	336,926	3,762	3,647	13	5	0	1	7	530	415
Pennsylvania	0	0	0	0	0	0	0	310	400	0	0	0	0	0	9	36
Texas	372	209	10	17	114	22	1,348,048	10,535	12,852	64	8	2	1	53	2,156	3,201
Dist. 1	12	6	0	1	5	0	36,177	564	735	4	1	0	0	3	230	253
Dist. 2	15	5	1	2	7	0	78,447	447	441	6	1	1	1	3	119	169
Dist. 3	19	7	0	0	12	0	137,751	768	1,052	7	2	0	0	5	170	310
Dist. 4	21	5	1	3	12	0	96,619	712	838	8	2	1	0	5	208	291
East	29	18	1	0	10	0	104,045	718	745	7	0	0	0	7	205	228
Dist. 7-B	67	31	0	2	24	10	134,364	1,408	1,667	16	2	0	0	14	391	604
West	100	77	3	0	20	0	448,049	3,077	3,649	11	0	0	0	11	433	530
Dist. 9	84	48	0	3	21	12	196,965	2,105	2,873	4	0	0	0	4	339	752
Dist. 10.	25	12	4	6	3	0	115,631	736	852	1	0	0	0	1	61	64
Utah	8	5	0	0	3	0	45,293	239	115	3	0	0	0	3	47	63
West Virginia	17	5	0	10	2	0	40,443	403	367	0	0	0	0	0	11	18
Wyoming	17	9	0	1	7	0	66,481	419	483	3	0	0	0	3	120	163
Miscl. (Mo.)	1	0	0	0	1	0	2,386	57	58	1	0	0	0	1	49	41
Total U. S.	930	464	16	72	344	24	3,703,307	27,425	31,137	178	25	2	3	148	5,457	7,027
Total prev. wk.	906	466	17	59	339	25	3,634,647	....	....	169	15	3	3	148	....	....
Cum. 1958	27,425	13,527	669	2,064	10,474	691	114,718,604	....	....	5,457	545	90	163	4,659	....	....
Western Canada	48	31	0	3	10	4	247,282	1,425	1,812	8	1	0	0	7	414	513

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	7-26-58	7-19-58	7-27-57
Pennsylvania	2,816	2,900	2,994
Other Appalachian	1,409	1,363	1,506
Illinois, Indiana, and Michigan	11,004	10,754	11,411
Nebraska and North Dakota	1,877	2,048	2,382
Kansas	9,856	9,968	11,401
Oklahoma	15,145	17,012	22,094
Arkansas	2,061	1,897	3,355
Louisiana	15,859	16,339	19,472
North	2,898	3,009	3,873
South	12,961	13,330	15,599
Mississippi, Alabama and Florida	2,256	2,166	2,490
New Mexico	6,061	6,221	9,132
Texas	102,735	103,254	128,531
East Texas	6,962	7,202	10,097
West Texas	50,590	48,857	62,561
Texas Gulf	19,624	20,192	24,545
Other Texas	25,559	27,003	31,328
Wyoming	14,290	14,605	17,841
Other Rocky Mountain	9,761	9,435	6,654
California	37,542	38,073	29,708
Foreign	†16,112	15,685	16,270
Total	248,784	251,720	285,241

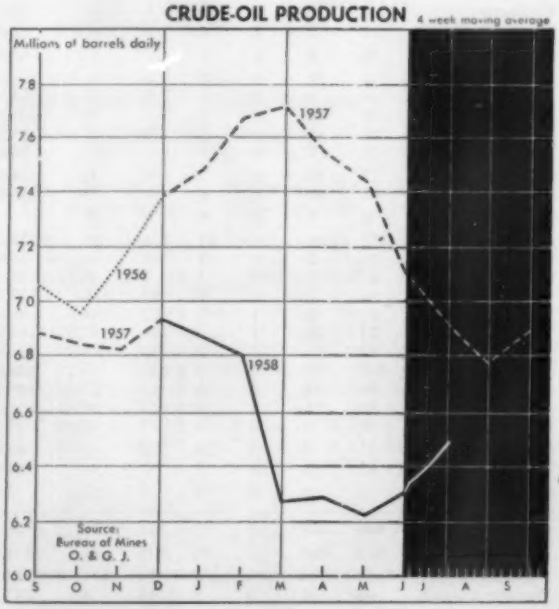
*Bureau of Mines. †Includes 4,273,000 bbl. in California.

DAILY AVERAGE PRODUCTION FOR WEEK

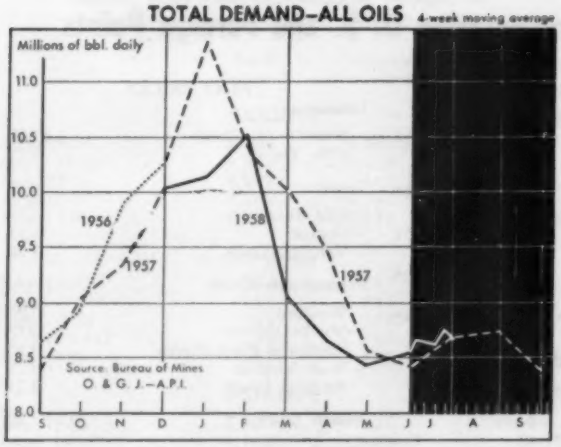
	August 2, 1958			
	Crude oil	Lease condensate	Total	July 26 total
Alabama	17,600	.....	17,600	17,700
Arkansas	74,325	200	74,525	73,700
California	856,300	.....	856,300	854,000
Colorado	133,500	.....	133,500	132,100
Eastern	48,300	.....	48,300	47,500
Florida	1,275	.....	1,275	1,275
Illinois	226,200	.....	226,200	226,900
Indiana	30,600	.....	30,600	30,800
Kansas	†327,550	.....	†327,550	†318,100
Kentucky	41,800	.....	41,800	41,900
Louisiana	728,825	82,050	810,875	810,950
North	102,825	2,000	104,825	104,900
South	626,000	80,050	706,050	706,050
Michigan	24,800	.....	24,800	24,100
Mississippi	94,225	3,975	98,200	98,200
Montana	77,800	.....	77,800	78,300
Nebraska	54,900	.....	54,900	54,100
Nevada	100	.....	100	100
New Mexico	271,200	5,200	276,400	276,400
North Dakota	39,700	.....	39,700	38,900
Oklahoma	†567,400	.....	†567,400	†572,100
Texas	2,343,000	63,100	2,406,100	2,406,100
Dist. 1	43,000	400	43,400	43,400
Dist. 2	96,000	8,600	104,600	104,600
Dist. 3	327,000	31,000	358,000	358,000
Dist. 4	175,000	8,200	183,200	183,200
Dist. 5	26,000	300	26,300	26,300
Dist. 6	100,000	6,200	106,200	106,200
East Texas field	129,000	.....	129,000	129,000
Dist. 7-B	125,000	100	125,100	125,100
Dist. 7-C	122,000	4,150	126,150	126,150
Dist. 8	912,000	1,900	913,900	913,900
Dist. 9	185,000	1,600	186,600	186,600
Dist. 10	103,000	650	103,650	103,650
Utah	102,000	.....	102,000	82,900
Wyoming	324,000	.....	324,000	320,200
Others	‡175	.....	‡175	‡175
Total U. S.	6,385,575	154,525	6,540,100	6,506,500
Change from previous week, up			33,600	
Canada	†494,700	.....	†494,700	†508,500
Total U. S. production, January 1-August 2			1,382,478,200 bbl.	
Same period last year (crude plus cond.)			*1,582,509,689 bbl.	

*Includes 30,168,725 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Washington.

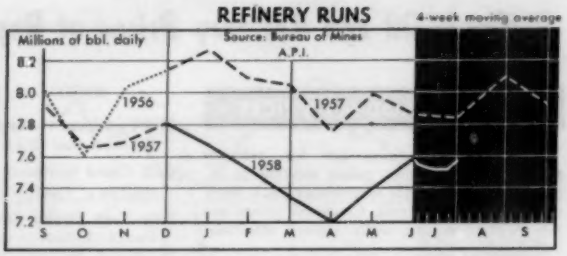
CRUDE-OIL PRODUCTION 4 week moving average



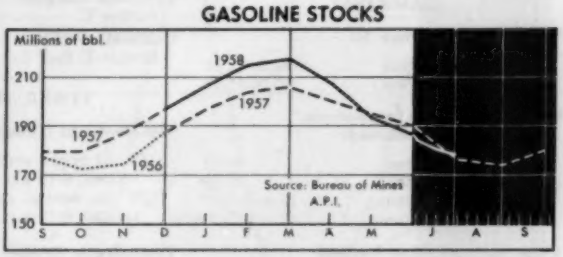
TOTAL DEMAND–ALL OILS 4-week moving average



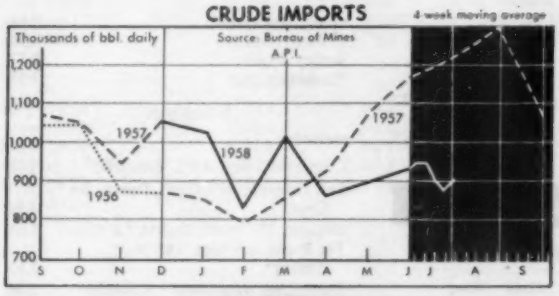
REFINERY RUNS 4-week moving average



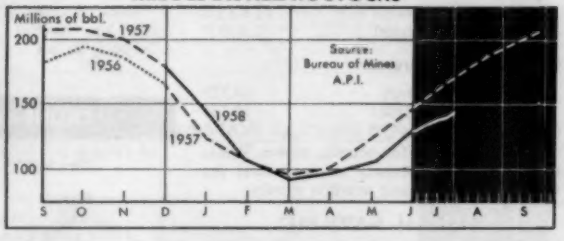
GASOLINE STOCKS



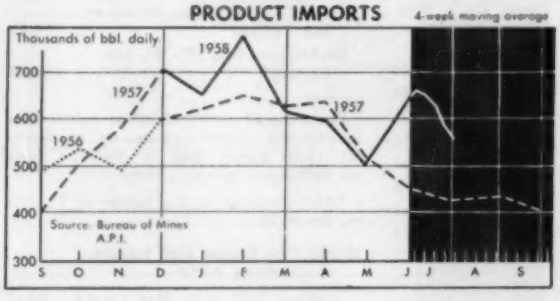
CRUDE IMPORTS 4-week moving average



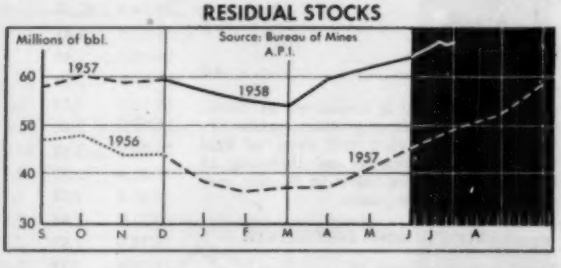
MIDDLE-DISTILLATE STOCKS



PRODUCT IMPORTS 4-week moving average



RESIDUAL STOCKS



API REFINERY REPORT—AUGUST 1, 1958

(Thousands of barrels)

District—	Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.	Stocks‡: Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1957: Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist	Resid.
East Coast	1,146	553.0	16.8	302.0	202.3	41,326	9,367	39,509	12,963	1,283	530.9	22.0	334.6	237.7
Appalachian:														
Dist. 1	83	39.3	.....	18.1	2.4	4,439	482	2,541	526	98	44.7	3.4	21.9	5.4
Dist. 2	107	62.9	5.6	18.3	10.4	2,316	527	1,191	330	68	37.0	2.3	10.3	8.1
Ind., Ill., Ky. ..	1,357	723.4	57.9	288.0	115.8	33,256	6,324	20,880	5,477	1,332	694.9	52.2	263.3	135.8
Minn., Wis., Dak.	116	53.6	11.1	20.9	18.6	6,724	1,402	6,538	592	105	50.1	7.5	26.7	8.1
Okla., Kans., Mo.	749	428.0	33.4	149.6	32.9	16,794	1,565	11,704	1,084	744	419.0	14.7	165.0	28.2
Inland Texas ..	275	198.1	7.1	49.0	17.3	6,602	361	1,976	2,023	286	210.6	8.0	52.8	21.3
Tex. Gulf Coast	1,727	927.1	65.6	429.3	200.1	22,452	2,642	12,486	8,660	1,917	990.5	92.7	505.2	231.2
La. Gulf Coast	617	367.3	38.0	179.3	42.1	9,117	1,718	4,978	1,469	656	358.3	33.6	168.1	45.4
N. La. and Ark.	101	34.3	4.9	19.4	7.9	4,577	838	2,418	175	91	32.2	5.3	19.2	6.8
Rocky Mtn.:														
New Mexico	13	9.9	.....	2.7	1.0	384	15	115	63	28	14.9	0.3	4.9	3.7
Other Rky. Mt.	283	130.1	1.0	52.4	30.3	5,591	282	2,790	949	292	141.3	4.2	63.2	36.6
West Coast ...	1,153	572.0	2.6	150.1	333.3	25,137	391	13,291	32,576	1,192	517.1	5.5	170.6	320.5
Aug. 1, 1958	7,727	4,099.0	244.0	1,679.1	1,014.4	178,715	25,914	120,417	66,887	8,092	4,041.5	251.7	1,805.8	1,088.8
July 25, 1958	7,517	4,066.3	230.6	1,680.0	988.4	178,808	25,338	115,557	66,487	.....	.....	.....	.....	.....
Aug. 2, 1957	7,919	3,916.7	292.1	1,688.4	1,080.1	175,994	31,454	138,230	49,140	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

Regular (89 octane)	12.00-12.25
Premium (99 octane)	15.00-15.25

Gulf Coast (cargoes for coastwise or export movements):

Regular (90 octane)	10.75
Regular (92 octane)	11.00
Premium (97 octane)	12.00-12.125
Premium (98 octane)	12.125-12.25

California (rack) (Los Angeles):

Regular (88 octane)	11.3-11.5
Premium (96 octane)	12.8-13.0
Premium (98 octane)	13.3-13.5

Caribbean area (cargoes):

Regular (87 octane)	10.375
Premium (97 octane)	12.125

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:

Grade 26-70	4.5

Breckenridge:

Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

Kerosine 42-44	9.50
Diesel oil (58 d.i. and above)	9.25
Distillate No. 1	9.25
Distillate No. 2	8.50

Gulf Coast (cargoes):

★ Kerosine 41-43	8.875
★ Distillate No. 2	8.625

New York Harbor (barges):

Kerosine 41-43	9.65
Distillate No. 2	9.15
Diesel fuel, 48-52 d.i.	9.75

Caribbean area (cargoes):

★ Distillate No. 2	8.625

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank car	6.50

New York (export):

126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3): Residual fuel (max. 1% S)	$1.30-1.35
Gulf Coast (cargoes): Bunker C fuel	$2.20-2.25
New York Harbor (barges): Bunker C fuel	$2.57
Caribbean (cargoes): Bunker C	$2.25
California (rack): Bunker C fuel, Los Angeles	$2.45

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.§	Mid-Cont.*	Gulf Coast Tex..†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.36	....	....	....	....
15-15.9	2.41	....	....	....	$1.81
16-16.9	2.46	....	....	....	1.86
17-17.9	2.51	....	....	....	1.91
18-18.9	2.57	....	....	....	1.96
19-19.9	2.62	....	....	....	2.01
20-20.9	2.68	$2.75	....	$2.62	2.06
21-21.9	2.73	2.77	....	2.64	2.11
22-22.9	2.78	2.79	....	2.66	2.16
23-23.9	2.84	2.81	$3.44	2.68	2.21
24-24.9	2.89	2.83	3.46	2.70	2.26
25-25.9	2.95	2.85	3.48	2.72	2.31
26-26.9	3.00	2.87	3.50	2.74	2.36
27-27.9	3.06	2.89	3.52	2.76	2.49
28-28.9	3.11	2.91	3.54	2.78	2.54
29-29.9	3.16	2.93	3.56	2.80	2.59
30-30.9	3.22	2.95	....	2.82	2.63
31-31.9	3.27	2.97	....	2.84	2.67
32-32.9	3.33	2.99	....	2.86	2.71
33-33.9	3.38	3.01	....	2.88	2.75
34-34.9	3.44	3.03	....	2.90	2.79
35-35.9	....	3.05	....	2.92	2.83
36-36.9	....	3.07	....	2.94	2.87
37-37.9	....	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma (sweet), part of Kansas, North Dakota, West Texas (sweet). †Low cold test crude. ‡Sour. §Some postings 3-11 cents lower.

Effective dates of broad changes: California, 6-22-58; east of California, January 3-10, 1957; Pennsylvania Grade, 6-18-58.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	3.90
Middle District	3.72
Southwest Pennsylvania	3.43
West Virginia	3.25
Buckeye Grade	3.25
Illinois Basin	3.00
Canada:	
Leduc-Woodbend	2.67
Redwater (Alta.)	2.56
Smiley (Sask.)	2.33
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26°-26.9°, Amuay*	2.55
Quiriquire, 16.0°-16.4°, Caripito	2.30
Lagunillas heavy, flat, Amuay or Las Piedras*	2.25
Bachaquero, flat, 15°-16°, Las Piedras*	2.08

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.49
Iraq, 36.0°-36.9°, Tripoli, Banias	2.49
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., dirty (USMC—12.5%)	$2.49
★ Carib.-U.S.N.H., clean (USMC—40%)	1.62
★ P.G.-U.K., clean (USMC—17.5%)	8.99
★ P.G.-U.K., dirty (Scale—47.5%) (28s. 5d.)	3.98

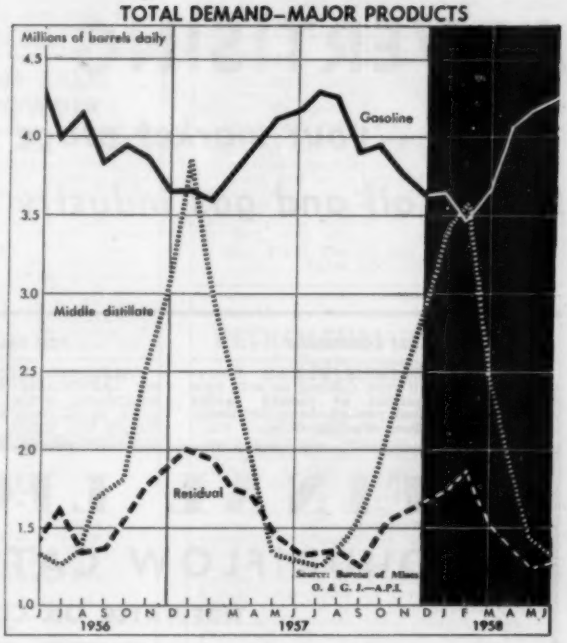
SUPPLY AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

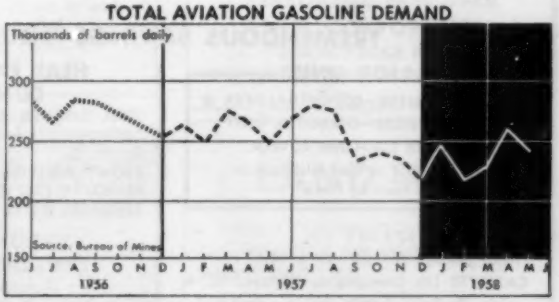
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
July 1958*	4,304	4,005	120,400
June 1958*	4,243	3,864	184,700
May 1958	4,089	3,669	195,188
August 1957	4,262	4,042	174,031
July 1957	4,286	3,832	177,868
KEROSINE			
July 1958*	184	239	25,900
June 1958*	172	255	24,200
May 1958	143	227	21,437
August 1957	164	252	34,576
July 1957	162	249	31,713
DISTILLATE			
July 1958*	1,207	1,657	120,400
June 1958*	1,162	1,642	105,150
May 1958	1,250	1,636	89,160
August 1957	1,175	1,806	159,124
July 1957	1,095	1,750	138,359
RESIDUAL			
July 1958*	1,274	991	66,900
June 1958*	1,286	945	64,300
May 1958	1,316	921	61,589
August 1957	1,399	1,089	52,645
July 1957	1,362	1,100	49,621

*Preliminary. †Thousands of barrels.

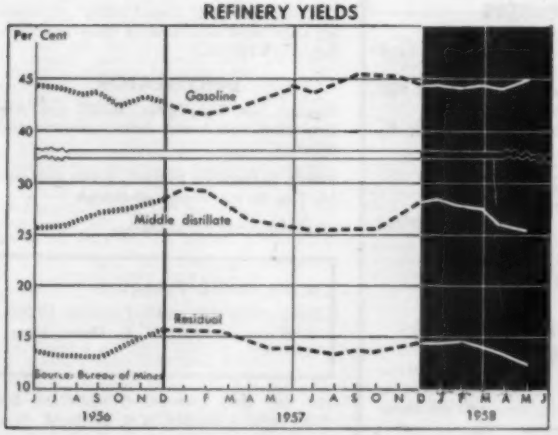
TOTAL DEMAND–MAJOR PRODUCTS



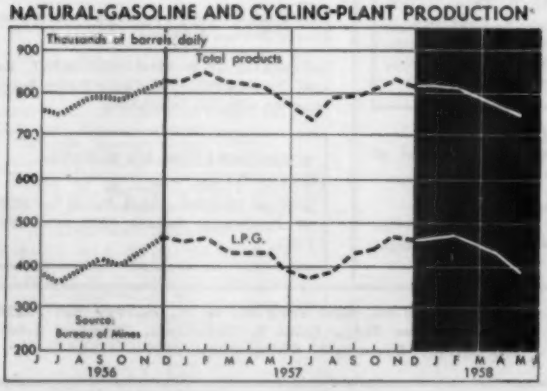
TOTAL AVIATION GASOLINE DEMAND



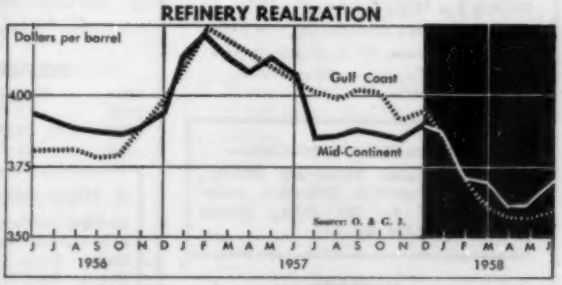
REFINERY YIELDS



NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION



REFINERY REALIZATION



REFINERY REALIZATION

	July* 1958	June* 1958	May 1958	July 1957
Mid-Continent	$3.73	$3.71	$3.67	$3.86
Gulf Coast	3.75	3.60	3.54	4.01

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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DEBUTANIZER—GIRBOTOL UNIT
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Will be sold as complete Units or Piece by Piece

KILN 18'-6½" ID x 55'8" OA
FINES Storage Bin 6'0" ID x 10'6"
CATALYST Lift Disengaging Hopper, 12' & 5'6" ID x 51' Croley 5
CATALYST Storage Hopper 12'6" x 160'11"
DRUMS: 8' x 28'9"; 5' x 14'; 4' x 12'
FINES Separators, Centrifix 16" type RVD
CATALYST Elevator, 72' cc, 8" x 5" Buckets
BAROMETRIC Condenser, Elliott #06HB, 8500# Steam/hr.

★ **OIL PREHEATER—PETRO-CHEM—**
Iso-Flow Furnace 19,000,000 BTU/hr., Inlet Temp., 447° F., 200 PSIG, Outlet Temp. 670° F., 135 PSIG. Charge Gas/Oil 106,294 lbs./hr.

TOWERS

8'0" x 75'0"	25 PSI	Monel lined 22 Trays
6'0" x 30'0"	50 PSI	9 Trays
5'0" x 58'0"	50 PSI	26 Trays
3'0" x 45'0"	260 PSI	Packed
3'0" x 32'0"	40 PSI	8 Stainless Trays
3'0" x 23'6"	600 PSI	Packed
2'6" x 77'6"	275 PSI	32 Stainless Trays
2'6" x 43'6"	180 PSI	24 Trays
2'6" x 30'0"	270 PSI	Packed

HEAT EXCHANGERS—CONDENSERS

STEEL TUBE 170, 880, 1080 Sq. Ft.
CUPRO-NICKEL Tubes Monel Clad Shell 1495 Sq. Ft. (2)
BROWN FINTUBE, Steel Shells & Tubes 600 PSI 600° F. (24) 101 to 141 Sq. Ft.
REBOILERS U-Tube Bundles, 220; 165 Sq. Ft.

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Motor & Turbine Driven
1½" x 2" Two Stage 1½" x 2½" Two Stage
2" x 3" 3" x 4" 4" x 6"
DUPLEX & SIMPLEX STEAM PUMPS
4½ x 4 x 6 up to 12 x 5 x 12
HOT OIL 6 x 4 x 6

POMONA PUMPS

GPM	PRESSURE	DRIVE
2600	75 PSI	200 HP Motor
1550	75 PSI	125 HP Motor
680	65 PSI	40 HP Motor

★ **STEAM GENERATOR—PETRO-CHEM**
Iso-Flow Furnace—Two Pass 25 Million BTU/hr., Inlet temp. 412° F., 375 PSIG, Outlet Temp. 420° F., 315 PSIG, Charge: Feed Water 289 GPM.

INSTRUMENTS

Complete instrumentation for control of all steps in process—Write for complete list.

CROLOY-5

New & Used Furnace Tubes—Write for List LARGE TONNAGE of Steel Pipe, Flanges, Fittings, Valves

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Otis Electric 6' x 6', Travel 182'6" 10 Opening stops same side. Rate of Travel 300 FPM, Capacity 2500 lbs.

DEHYDRATOR

Propane Gas Dehydrator, 20,000 gal./day, Type EXHC—SX Anders Fully Automatic dual tower.

ETHYL BLENDING PLANT, 8,500 gallon—60 Ton Howe Weigh-O-Graph

HARDINGE API Oil Separator

★ **AIR HEATER—PEABODY—**
Direct Fired API-ASME—Capacity 10,000 SCFM Inlet temp. 100° F., Outlet Temp. 1200° F.

125 KW GAS ENGINE GENERATOR SET, 2300 Volts, 3/60/514 RPM, Exciter & Panel Board.

LARGE QUANTITY of Explosion Proof Motors, Electric Starters & Fittings.

AUTOMATIC TELEPHONE EQUIPMENT, Kellogg Cordless PBX—100 Circuit Switch Board, complete with 100 Telephones.

★ **REGENERATION AIR BLOWER—**
ELLIOTT 11,000 CFM — @ 11 PSIG. — 2 Stage Meehanite Case Driven by 600 HP Condensing Turbine 6200 RPM 290 PSIG.

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310 Thompson Bldg., Tulsa 3, Oklahoma, Diamond 3-4890
SITE OFFICE—Drumright, Okla., Phone 569

FOR SALE EQUIPMENT

NEW OIL PUMPS—Delaval Imo, 3x2½, 100 GPM, 120 PSI, 1750 RPM. Bargain price—$225.00 each. H. H. Schwartz, Compton Electric & Machinery Co. 3205 Chouteau Ave. St. Louis, Missouri.

16,000' 4½" GRADE E, API Full Hole Drill Pipe W/Hard Band. Excellent condition. Don Harman Pipe & Supply, P. O. Box 4401, OR 7-4343, Okla. City.

9300 FT. 3½" GRADE E 13.30# Drill Pipe w/3½" IF Hughes Flashweld Tool Joints, hardfaced. 18 Drill Collars, approx. 5" OD. Harries Sales & Rentals, Inc. P. O. Box 1568, Odessa, Tex.

10,000 FT. 4½" GRADE E 16.60# Drill Pipe w/4½" extra hole Hughes Flashweld Tool Joints. Tool joints ave. 5¾" OD. All or part. Harries Sales & Rentals, Inc. P. O. Box 1568, Odessa, Tex.

2 CATERPILLAR 3 phase light plants, 20 and 30 kilowatts, $3000.00 for the two. This is quality merchandise. Only reason for selling our load has trebled. Betz, Phone 39, Lane, Kansas.

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CFD-1 FAILING mounted on 1953 International 5x6 pump; New 16 ft. kelley; excellent condition. Carlson Core Drilling Company: 9208 West Highway 54, Wichita, Kansas.

8" COUPLINGS with Dutchman, A-1 Shape, standard 8 thread line. Indiana-Ohio Pipe Co. P.O. Box 323, Decatur, Ind., Phone 34674.

8⅝ OD 20# LAPWELD Line Pipe, 200,000 feet No. 1 Screw or Plain End. Box 1215—Phone DI 3-9563, Tulsa, Oklahoma.

1956 FAILING 1500 HD, equipped. Excellent condition. Additional drilling equipment. Richard Travis, Box 1347, CHapel 2-8331, Grand Junction, Colorado.

ALL STEEL Vertical Oil Storage Tanks. 16—11'0" O.D. x 21'0" High. 8—20'0" O.D. x 20'0" High. 2—35'0" O.D. x 47'3" High. Including manholes, ladders and walkway. All welded. Also 1—100 HP and 1—80 HP Erie City Boilers and 1—60 HP Cleaver-Brooks Boiler. All 150 lbs. pressure and complete with natural gas burners and auxiliary equipment. Cleaver-Brooks Boiler purchased new in 1954. All other items purchased new in 1949. Used only short time. Contact Lee Atherton, Archer-Daniels-Midland Co., Minneapolis, Minnesota.

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1946 FRANKS 4000 SD Servicing unit on International K8. Fair condition. $3500.00. Mumy Well Service. TE 2-5263, Reed City, Mich.

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8⅝" RECEDING diehead with head screw and taper attachment. Equipped with 2 speed motor and 8 sets of dies for 8 round, 10V and 8V threads. Bargain price. B & B Pipe & Tool Co., 3035 Walnut Ave., Long Beach, Calif. Phone GArfield 4-0704.

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Capacity 1500' to 10,000'. Immediate delivery. Your chance to buy on liberal terms or lease with option to purchase. Inventories supplied upon request.

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New 16" O.D. Line Pipe
(Limited Service)

25,000 FT. 16" O.D., .281 WALL, 47.2#
UNIONMELT ELECTRICWELD
All in app. 40 Ft. DRL, Beveled and Mill Tested to 650 Lb.
Priced attractively, prompt shipment.
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LINER FOR 5½" CASING. 1100' 4" OD, lp. 9 lb., 11½" thread, Range 1. Purchaser take all @ 85c. M. J. Regan Pipe Co., Coffeyville, Kans.

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FOAMITE POWDER

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Will trade for good surplus equipment American La France "Foamite" Single Generator Powder for use in single hopper foam generators for extinguishing all liquid hydrocarbon fires. 5 gal., 50 lb. pails. EXCELLENT CONDITION! Delivery anywhere U.S.A. on orders of 500 pails or more. Other discount 15% FOB San Diego, California.

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All replies confidential.

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Work will be to assist with plant operations such as catalytic cracking reforming, de-sulphurization, atmospheric and vacuum distillation, polymerization, asphalt, wax, etc.

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PERSONNEL MANAGER
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1600 W. 8 MILE ROAD
FERNDALE 20, DETROIT, MICHIGAN

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1. High caliber land men (2) under 35, with ability, a good record of accomplishment, and Gulf Coast experience. Location Gulf Coast Area.
2. Man of stature capable of handling large deals throughout the world.

Send complete and detailed resume, snapshot, and salary requirements to Box K-786, The Oil and Gas Journal, Tulsa, Oklahoma.

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Major Company with expanding, diversified oil and gas operations, has an opportunity in Houston, Texas for a lawyer with at least two years of oil and gas experience. Fluent knowledge of Spanish essential. Age—25 to 40. Excellent benefits. Salary commensurate with experience and training. Send complete personal history including experience and education to

Box K-811, The Oil and Gas Journal, Tulsa, Oklahoma.

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LARGE, aggressive, independent oil company has opening in gas department for college graduate 25 to 35, experienced in handling gas contracts with gas producing or transmission company. Must be good at detail work and have capacity to advance. Knowledge of state regulations governing gas production and transmission helpful. Send detailed resume including salary requirements to Box K-795, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Man with minimum ten years experience in sales and service of leasehold tanks and related equipment to head up sales of these items in large, growing organization, location Mid-Continent. All replies strictly confidential. Send detailed resume, snapshot, and salary expected to

Box K-809,
The Oil and Gas Journal,
Tulsa, Oklahoma.

PETRO ENGINEERS

Graduate engineer with experience in oil producing operations, including pressure maintenance, secondary recovery, primary depletion. Initial assignment in New York office in reservoir engineering and research section concerned with oil field development studies. Salary and position commensurate with qualifications.

Write giving full particulars regarding personal history and work experience.
RECRUITING SUPERVISOR, BOX 282

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CHEMICAL ENGINEERS

With 7 or more years experience in operations and economics required for overseas position with American firm advising local government on initial operation of new refinery. Good climate, excellent family living conditions, attractive salary. No foreign language requirement.

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and COMPANY
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Major Oil Company desires Chief Accountant for Crude Oil Production Department, Southwest. Minimum BBA Degree required. Age 35-45. Must be thoroughly experienced in all phases of accounting relating to the production, purchase, sale, and transportation of crude oil and gas. Experience in supervising large accounting organization desirable. Must have knowledge of machine accounting. Replies confidential.

Box K-814,
The Oil and Gas Journal,
Tulsa, Oklahoma.

HELP WANTED

FOREIGN EMPLOYMENT. List oil companies, drilling contractors, seismograph contractors, showing where apply foreign jobs, $5.00 cash. Oil Industry Mailing List Co., Box 2603, Tulsa, Oklahoma.

SITUATION WANTED

MAINTENANCE SUPT. (47)—Canadian, 25 years refinery and related experience—6 years Spanish Countries. Desires foreign or domestic position, available immediately. Resume on request. Reply Box K-807, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 32, M.S. Caltech, special studies in sedimentation wants position as petroleum geologist. Eight years varied domestic engineering experience with major company in development drilling operations, property evaluations, subsurface studies. Box 31 J 282, The Oil and Gas Journal, 4041 Marlton Ave., L.A. 8, Calif.

LANDMAN—22 years experience in Mid-Continent, Gulf Coast, Rocky Mountain areas and Canada. Familiar with lease acquisitions, farmouts, contributions and joint operations. Presently employed as regional landman. Will relocate. Address Box K-812, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN-ATTORNEY—6 years leasing, curative, administrative, Federal Unitization—Mid-Continent, Rockies—capable, reasonable—for details, Box K-802, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: diversified experience South Texas desires retainer from active independent or investment group. Resume and interviews on request. Box K-808, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 29, Single—2½ years varied experience including year as mud Engineer on Gulf Coast, desires foreign or domestic position with contractor, service company or independent. Box K-813, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM

OILFIELD RESEARCH INC. ARG.

—Geologist specialists in Southern Argentine Basins (Exploration — Surface — Subsurface and Seismic Experience)
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—ARGENTINE PROFESSIONALS OF LARGE EXPERIENCE AND CONNECTIONS.

Write to: DR. LUIS CLAVIJO
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10% OF PRODUCING Oil Well. $10,000. Approximately 30% return on investment. Swartout, Tustin Oil Co., 245 W. 1st St., Tustin, Calif. LI 4-7480.

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TWIN BONANZA, 1957 model, 125 hours total time on engines and frame. All latest equipment for blind flying. New cost $94,000.00. Will sacrifice for quick cash sale. H. M. Naylor Oil Company, 1100 First City National Bank Building, Houston 2, Texas.

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Capital available for construction of gasoline plant in size range 10-30 MMCF.

BOX K-810.
THE OIL AND GAS JOURNAL.
TULSA, OKLAHOMA.

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that a parcel containing 160 acres described as the SW¼NW¼ Sec. 19, T. 9 N., R. 27 W., S½SE¼, SE¼SW¼; Sec. 13, T. 9 N., R. 26 W., 5th P. M., Arkansas, within the known geologic structure of Cecil Field will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 P. M., E.S.T., August 27, 1958 when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Eastern States Land Office, Washington 25, D. C., H. K. Scholl, Manager, Eastern States Land Office, Washington 25, D. C.

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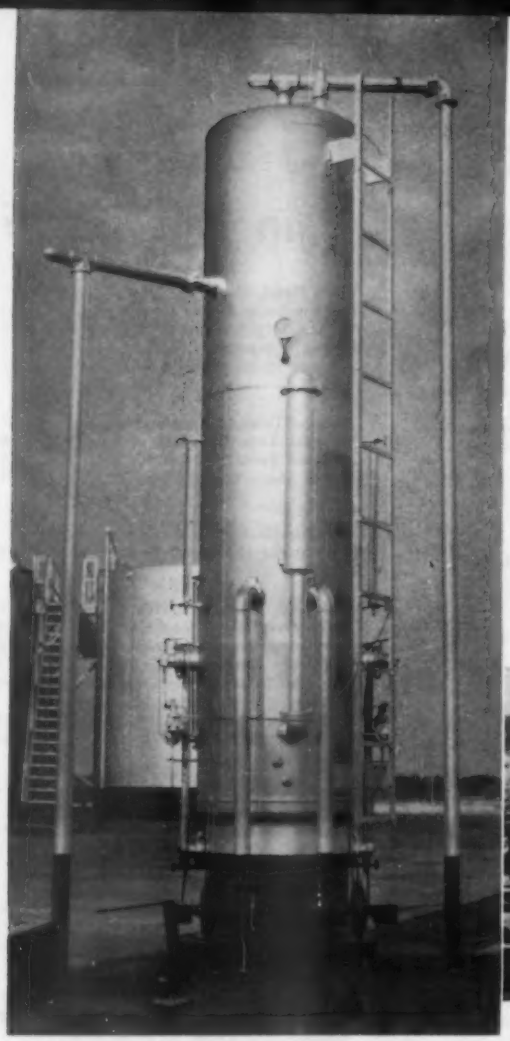

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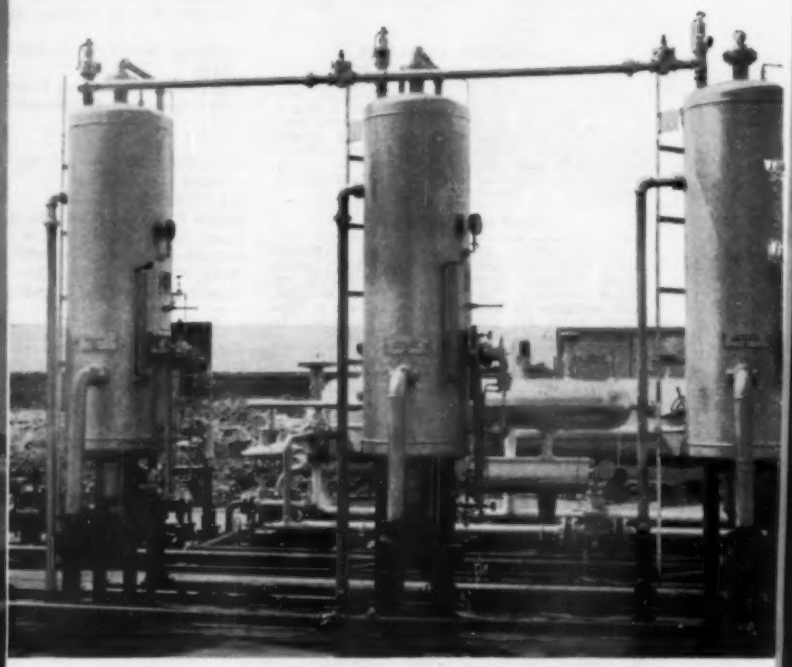

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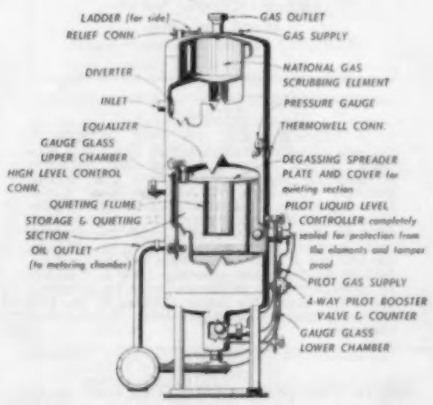

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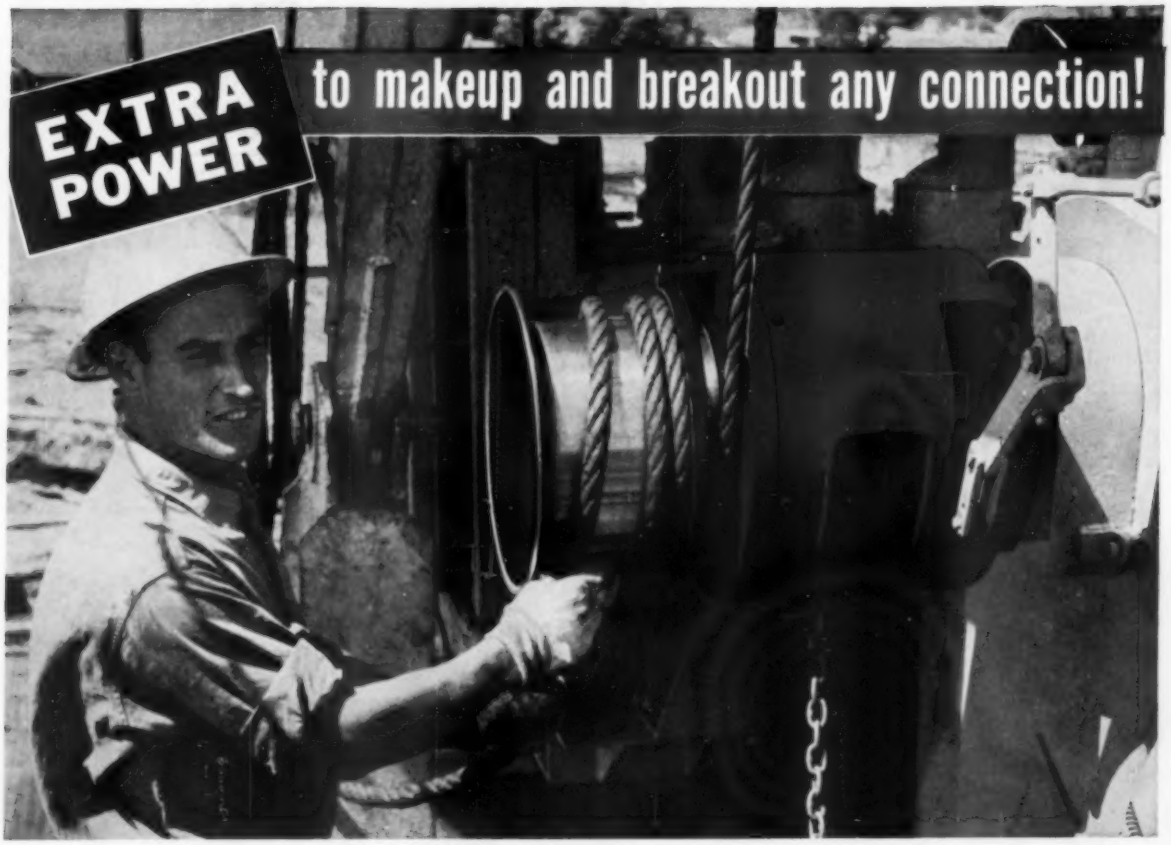

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